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Research in Agriculture

LOUISIANA

ANNUAL REPORT
1944 - 1945

W. G. TAGGART, DIRECTOR
EXPERIMENT STATIONS



Research in Agriculture

1944-1945



ANNUAL REPORT



AGRICULTURAL EXPERIMENT STATION
LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE, LOUISIANA

W. G. TAGGART, *Director*



Compiled by I. L. Forbes from Reports of Heads of
Departments and Project Leaders

Year Ended June 30, 1945

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Letter of Transmittal

Baton Rouge, Louisiana

May 25, 1946

GOVERNOR JAMES HOUSTON DAVIS

BATON ROUGE, LOUISIANA

My Dear Sir:

I have the honor to transmit herewith, through the Dean of the College of Agriculture and the President of the Louisiana State University and Agricultural and Mechanical College, the report of the work, receipts, and expenditures of the Louisiana Agricultural Experiment Station for the year 1945, as required by the Hatch Act, which provided for the establishment of agricultural experiment stations in the several states.

Copies of this report will be sent to the United States Department of Agriculture in Washington, D. C., and to the other experiment stations, as required by the Hatch Act, and a sufficient number will be printed to enable us to supply members of the Legislature, Public Boards, libraries, and leading agriculturists.

Very respectfully,

W. G. TAGGART, *Director*
Louisiana Agricultural Experiment Station

Agricultural Chemistry and Biochemistry

Nutrition Research Division

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Ascorbic Acid Value of Tomatoes Canned by Five Home Processing Methods

A previous study indicated large variations in the individual ascorbic acid values of tomatoes which had been canned in homes by various processing methods and in different types of containers. Since only slight differences were found in the average ascorbic acid values for these methods of processing, this project was planned to determine whether tomatoes canned in one type of container under controlled conditions would show significant differences because of processing methods.

Two varieties of tomatoes, Marglobe and Dixie Gulf State Cross, were canned in scalded number 2 tin cans. After scalding, peeling, and coring, each tomato was cut into five vertical sections and these distributed to each of the containers for the five methods of processing. The following methods were used: A. The cold fruit was packed into the cans, then heated to 180°F. by surrounding the cans with boiling water. After sealing, the filled cans were processed for four minutes under 10 pounds pressure. B. Tomatoes were packed, heated in the cans, and sealed as in A, but processed in a boiling water bath for 35 minutes. C. Sufficient tomatoes to fill at least two number 2 cans were heated to the boiling point in an aluminum sauce pan, poured into the cans, sealed immediately, and processed for four minutes under 10 pounds pressure. D. Tomatoes were heated, packed, and sealed as in C, but processed 10 minutes in a boiling water bath. E. Sufficient tomatoes to fill at least two number 2 cans were boiled in an open aluminum sauce pan for 20 minutes, poured into the cans, and sealed.

All cans after sealing and processing were cooled immediately in running tap water. Eighteen cans were packed by each method. During the one week required for initial ascorbic acid determinations all cans were stored at refrigeration temperature.

At the conclusion of this period the remainder were stored at room temperature and analyzed six months later. The storage period was from June to December.

On the basis of moist weight, average ascorbic acid values for methods of canning other than open kettle were approximately equal; whereas in the case of the latter, a slightly higher average value was found. It

was obvious, however, when the results were calculated on the basis of dry weight, that this slightly higher value was due to a concentration of nutrients of the tomato rather than higher retention, for ascorbic acid values on a dry weight basis were lower in the case of the open kettle processed fruit. Average values for the freshly canned and the stored fruit processed by the different methods are shown in Table 1.

TABLE I. AVERAGE ASCORBIC ACID VALUES OF NINE CANS OF TOMATOES BEFORE AND AFTER SIX MONTHS STORAGE

Method of Processing	Milligrams Ascorbic Acid per 100 grams Moist Basis	
	June	December
A	16.6	14.4
B	17.2	14.6
C	17.0	14.8
D	16.6	14.6
E	18.3	16.0

None of the canned fruit showed evidence of spoilage. The flavor and appearance of the open kettle processed fruits was inferior to that processed by the other four methods, and cold packing resulted in larger head space than hot packing.—*Martha E. Hollinger and Leona Johns.*

Varietal Differences in the Ascorbic Acid Value of Strawberries

Standard and seedling varieties of strawberries produced by the Horticulture Department of this station were analyzed for ascorbic acid three times each season during 1942, 1943, and 1944. Samples were obtained early in the production period, again when the plants were producing heavily, and near the close of the season when yields became smaller. During the 1942 and 1943 seasons, ascorbic acid values were highest in most cases early and late in the season. In 1944, however, the highest values were obtained at the mid-season sampling. Although ascorbic acid values for each variety varied considerably, those varieties having the highest values remained consistently in the higher ranks while those having lowest values remained consistently in lower ranks. The Fairmore variety had, in most instances, the highest ascorbic acid value of all varieties tested. The average results of all determinations made on the Fairmore variety was 77 milligrams ascorbic acid per 100 grams. A cross between two Blakemore-Klondike seedlings designated as 117-1 gave average results only slightly lower than Fairmore. The Klondike and Klonmore varieties ranked rather consistently low while the Konvoy variety was more variable. Average results of all determinations on these varieties were as follows: Konvoy, 62; Klondike, 58 milligrams per 100 grams.

A single sampling in 1945 included a number of seedlings which resulted from crossing the Fairmore with other varieties. Some of these showed values approximating those of the Fairmore while others ranked low.—*Martha E. Hollinger.*

Carotene and Ascorbic Acid Content of Sweet Potatoes

This study, one of the Southern Cooperative Group Projects, has as its objective the determination of the effects of environment, curing, and storage on the carotene and ascorbic acid content of nine varieties of sweet potatoes. The sweet potatoes were produced through the co-operation of the Horticulture Department.

During a period of one week of curing and three weeks storing after harvest only slight changes were noted in the ascorbic acid and carotene content of the nine varieties of sweet potatoes. Further storage for another month indicated a rather definite trend toward lower values for both of these vitamins for all varieties.

Varietal differences in carotene content were definitely shown, values varying from 58.6 milligrams of carotene per 100 grams dry weight for L64 to 9.3 milligrams per 100 grams dry weight for B2934. There were only slight varietal differences in the ascorbic acid content.

—*E. A. Fieger, Harvye Lewis, Martha E. Hollinger,
Leona Johns, and Janis Gibbens.*

Vitamin A Content of Milk and Butter

In September, 1945, two years of analyses for vitamin A and carotene of dairy and creamery milk and creamery butter had been completed. The results obtained during the second year of the experiment confirmed those obtained during the first year with one exception (see Annual Report for 1943-1944). Because of better distribution of rainfall during the summer of 1945 resulting in better pastures and grazing, the vitamin content of dairy products was considerably higher for that period when compared with that of the previous year. Average values for vitamin A for the two-year period were: 1970 International Units per quart for herd milk, 1620 International Units per quart for creamery milk, and 14,500 International Units per pound of creamery butter.

—*E. A. Fieger and Harvye Lewis.*

Enriched Rice

On December 4, 1945, the patent office granted to Louisiana State University patent number 2,390,210 on the process for fortifying of rice with vitamins, which process was developed in this laboratory. Subsequently the University Board of Supervisors adopted a resolution making available this process free of royalty or fee to the rice industry.

—*E. A. Fieger and Virginia R. Williams.*

Further Studies on Growth Stimulants for the Microbiological Biotin Assay

The microbiological determination of biotin using *L. arabinosus* has been found stimulated by small amounts of rice oil in a manner similar to that reported by this laboratory for the biotin assay employing *L. casei*.

To determine whether the lipoid microbiological growth stimulants found in rice polish could be utilized as biotin by chicks, four diets were compared in a four weeks growth study with day-old White Leghorn chicks, using: (1) basal diet plus synthetic biotin, (2) basal diet plus natural biotin from rice polish, quantities of the latter calculated from microbiological assay of defatted (stimulants-free) rice polish, (3) basal diet plus natural biotin from rice polish, quantities of the latter calculated from microbiological assay of whole (stimulants present) rice polish, and (4) basal diet devoid of biotin.

After four weeks on the above diets administered ad libitum, chicks were examined for symptoms of biotin deficiency with the following findings: (1) diet 1, 7% deficient; (2) diet 2, 0% deficient; (3) diet 3, 83% deficient; (4) diet 4, 75% deficient. Under the conditions of the experiment, percentages for diets 1 and 2 were regarded as essentially the same; likewise, for diets 3 and 4.

It was then concluded that biotin calculations made from assay values of whole rice polish were invalid as regards biotin utilization by chicks, and therefore, that the lipoid materials responsible for the erroneously high assay values so obtained could not be used by the chicks as biotin.—*Virginia R. Williams and E. A. Fieger.*

Human Nutrition Studies in Progress

One objective of this Department since its formation has been to include in its nutrition work investigations applying directly to human nutrition. This phase of the work has been greatly augmented through the grant of financial assistance generously supplied by the General Education Board. The following projects have been supported by funds from this grant.

Study of Nutritional Status of Pregnant Women

A study is being made of the nutritive value of the diets consumed by pregnant women. The ascorbic acid content of the blood plasma will be correlated with ascorbic acid intake, and excretion of riboflavin, thiamine, and F_2 (N methyl nicotinamide) will be correlated with dietary intake of the B vitamins.

These investigations are conducted in cooperation with and supported in part by the Louisiana Department of Public Health, Miss Margaret C. Moore, Nutritionist. Determinations of excretion of the B factors were made under the direction of Dr. Grace Goldsmith of the Tulane University School of Medicine.

As a supplement to this study and in conjunction with the Nutrition Education Research program of the Department of Home Economics, determinations of the ascorbic acid content of the blood plasma of approximately 100 high school girls are in progress.

—*Martha E. Hollinger, Maud Purdy, and Janis Gibbens.*

Utilization of Ascorbic Acid of Leafy Vegetables by Humans

A continuation of the project undertaken in the spring of 1945, this project is designed to ascertain the utilization by human subjects of ascorbic acid from leafy vegetables in comparison with crystalline ascorbic acid. Results will be reported when data on sufficient subjects have been obtained to justify interpretation.—*Martha E. Hollinger.*

Exerimental Lathyrism

Rations containing a high percentage of Singletary peas (*Lathyrus pusillus*) produce a characteristic paralysis (lathyrism) in young rats. This syndrome is caused by some extractable substance present in the pea since pea meals extracted with either water or alcohol are incapable of producing the condition. Brewer's yeast and casein do not have any protective action against lathyrism. Alpha-tocopherol in relatively large doses does have definite prophylactic value. This is not improved by the addition of inositol to the tocopherol supplement. Animals in the early stages recover promptly when placed on a good diet. Recovery is rare once the late stages of the paralysis have developed.—*Jordan G. Lee.*

The Detoxication of Tung Meal

This project has been continued along lines indicated in the Annual Report for 1943-1944. It has been found that the toxicity of commercial expeller meals decreases markedly, but not completely, on common storage. This is not the case with the solvent extracted meal. The meals can be completely detoxified by a combination of heat treatment and alcohol extraction. Both treatments are necessary. As the toxic factor soluble in alcohol is also soluble in certain other solvents, these presumably could be substituted for the alcohol.

The protein of the detoxified meals is of little biological value as a supplement to cereal proteins.—*Jordan G. Lee.*

The Toxic Principles of the Tung Nut

The tung nut toxic factor which is soluble in ethanol is also extracted to a less extent by acetone, acetic acid, benzene, carbon tetrachloride, chloroform, ether, ethyl acetate, and trichlorethylene. It is not extracted in detectable quantities by dioxan, nitromethane, or Skellysolve B. This factor is heat stable under conditions unfavorable to oxidation but is

easily destroyed in the presence of ferric ion and by saponification with alcoholic potassium hydroxide. By centrifuging, the alcohol extract may be broken into three parts. The fraction with the greatest specific gravity is non-toxic.

The above studies on toxicity have been supported by the grant of funds from the General Education Board.

—James A. Watson and Jordan G. Lee.

Division of Food Preservation

Strawberry Studies

The literature on the freezing of fruits contains conflicting reports concerning the concentration of sugar and sugar syrups which should be added to fruits to give the most desirable product. Recommendations for sugar syrup solutions vary between 35 and 70 per cent in sugar concentration; for sugar, from one pound of sugar to three pounds of fruit to one pound of sugar to six pounds of fruit.

The effects of syrup concentration, ratio of sugar to berries, preparation of berries, and conditions of freezing upon the chemical, physical, and organoleptic properties of strawberry packs were studied. Strawberries of the Klondike variety were prepared and frozen in the spring of 1944 and were examined during the summer and fall of 1945 after approximately 18 months storage at 0° F. All samples were packed in cellophane bags in end-opening cartons with overwrap.

Sliced berries packed with either dry sugar or sugar syrup gave a more desirable product than whole berries. The sugar penetrated more readily into the former resulting in a better preservation of the flavor and a uniform flavor in berries and juice. For whole berries packed with dry sugar a ratio of one pound of sugar to four pounds of berries gave the superior product and resulted in a better interchange between the sugar and the juice of the strawberries, than those in which less sugar was used. Samples packed without sugar were of very poor flavor and of exceedingly sour and slightly salty taste. No marked differences in physical or chemical properties were noted when freezing in still air was compared with freezing on plate freezers. Under the conditions of this experiment, however, the rate of freezing by the two methods was not greatly different. In a comparison of the samples which were frozen immediately and those frozen after one hour's delay, the former samples had greater concentration of sugar in the berries than the latter samples, contrary to expectation. This difference, however, arises from the fact that in the latter method more juice accumulates in the lower part of the package and results in less contact of sugar with berries. Delay in freezing under these conditions, therefore, is not recommended.

The average freezing point of the juice after thawing from samples containing 16.6 per cent dry sugar was 22.96° F. (—5.02° C.) for strawberries frozen whole, and 25.23° F. (—3.76° C.) for the sliced berries. For syrup packs containing the same per cent sugar the value for whole berries was 19.60° F. (—6.89° C.) and for sliced berries 24.93° F. (—3.99° C.). The freezing point of the drip from berries frozen without added sugar or syrup was 29.46° F. (—1.41° C.).

—*E. A. Fieger, C. W. DuBois, and S. Kalogereas.*

Shrimp Studies

Shrimp is an important food because of the high nutritive value and pleasing flavor. As an article of commerce of the state of Louisiana and a source of income, the industry bulks large, the catch for 1944 being 105,000,000 pounds valued in excess of \$9,000,000.

Since little scientific information is at present available to the shrimp industry, the Division of Food Preservation began in the fall of 1944 a series of chemical and bacteriological investigations of the problems involved in the handling, processing, storing, packaging, and freezing of shrimp. Expansion of these studies has been aided by a grant from the Refrigeration Research Foundation.

Frozen Shrimp

Many factors may affect the quality of frozen shrimp. In this investigation a study was made of the effect upon quality of (1) various handling methods and conditions and (2) holding fresh caught shrimp before freezing. A field laboratory was set up aboard the shrimp vessel "Betty Jean" owned by Mr. G. C. Lewis. Shrimp samples for this study were taken immediately after the nets were hoisted onto the deck, the shrimp being either headed or left as whole shrimp, and frozen immediately or packed in ice for varying periods of time. At the time of freezing all samples were packed in one-piece telescope boxes with outside overwrap of glassine and were frozen in a plate freezer aboard the boat. The samples were stored for six and nine months at 0° F. before organoleptically tested. For these tests, the samples without previous thawing were cooked in boiling water for 15 minutes, a one-pound box of shrimp being added to one quart of water.

The organoleptic tests showed, for quick freeze preservation and storage, that shrimp should be headed and frozen as soon as possible after catching. Shrimp packed in ice for longer than four days as headed shrimp or longer than three days as whole shrimp before freezing resulted in a definitely inferior product after six months frozen storage. After nine months frozen storage only those shrimp which had been headed and frozen immediately after catching were satisfactory. Greater difficulty, because of adherence of the shell to the meat, was encountered in peeling those samples which had been in frozen storage

for nine months. It was also noted that the shell tended to split into layers and in many cases thin layers of shell remained adhering to the meat. The uncooked shrimp had normal appearance except for dark areas at the shell joints; after cooking, peeled shrimp were normal in appearance.—*E. A. Fieger and C. W. DuBois.*

Packaging of Shrimp

It is well recognized that proper packaging with moisture-vapor-proof material is necessary to prevent drying of the product since the drying of the product during storage causes marked changes in flavor and general quality. In this study fresh caught headed shrimp were packaged and frozen in various type containers now being manufactured and used by industry. Moisture losses were determined by weighing at regular intervals. For the various packaging materials, moisture losses after 12 months storage were as follows: one-piece telescope carton, 1.6 per cent; two-piece telescope carton with overwrap, 2.34 per cent; moisture proof bag in carton, 2.34 per cent; two-piece telescope carton, 5.23 per cent; and container now generally used, 6.55 per cent. Examination of the shrimp after 12 months storage showed a definite correlation between moisture loss and appearance.—*E. A. Fieger and C. W. DuBois.*

Loss of Added Vitamin C in the Storage of Frozen Peaches

In the frozen food industry the use of ascorbic acid (vitamin C) to inhibit browning of peaches and apricots is rapidly gaining favor, especially for fruits in consumer packages, because it is effective without altering the flavor or color and it enhances the food value of the fruit.

Various preparation procedures and types of sugars were studied in relation to their effect upon the retention of vitamin C during subsequent frozen storage of peaches. Elberta variety peaches of uniform ripeness, obtained from the North Louisiana Agricultural Experiment Station, were used in this study. Preparation procedures included steam peeling and lye peeling. In steam peeling, the peaches were exposed to live steam for 45 seconds, then cooled. The peel was then removed by hand, quickly and easily. In the case of lye peeling, the peaches were immersed in a hot lye solution until the skins were loosened. The lye and the peel were removed from the fruit by washing in a stream of cold water. In one set of samples the lye remaining on the fruit after peeling was neutralized by immersion of the fruit in a 2 per cent citric acid solution. The sugars used included cane sugar syrup, and third-run cane sugar syrup. The peaches were packed in cellophane-bag-lined end-opening cartons with overwrap. Each package contained 300 grams of peaches, 100 grams of 50 per cent syrup and 0.25 grams of added vitamin C. All samples were stored at a uniform temperature of $0^{\circ}\text{F.} \pm 2^{\circ}$

F., except one series packed in cane sugar syrup, which was held in a fluctuating temperature of $+5^{\circ}$ F. to -5° F.

The greatest loss of vitamin C occurred during frozen storage as a result of fluctuating temperature. Of the added ascorbic acid, 50 per cent was lost during the storage period of one year, while like packs stored at a relatively constant temperature lost but 32 per cent of the vitamin C during the same period. Steam peeling resulted in a slightly higher ascorbic acid retention than lye peeling. The effect of lye peeling on ascorbic acid retention, however, was less striking than that of fluctuating temperature. The use of 2 per cent citric acid dip to neutralize the lye residue after scalding in hot lye showed a slight advantage over removing lye by a water rinse. The type of sugar used had no effect upon ascorbic acid retention.—*C. W. DuBois and Dorothy Colvin.*

Potato Studies

This work is a continuation of the project undertaken several years ago to develop methods of preparing, freezing, and storing Irish potatoes. Seventeen varieties of Irish potatoes were cut French fry style, Julienne strips, steam blanched and frozen. Storage for a period as short as one month resulted in an unsatisfactory product when cooked in deep fat. The potatoes had a "warmed over" taste, and were greasy throughout. Upon cooling to room temperature they rapidly lost their crispness.

Partial cooking of the potato strips in deep fat at 180° C. (356° F.) for two and one-half or for five minutes, instead of steam blanching, to inactivate enzymes resulted in a much superior product. After four months storage at 0° F., cooking in deep fat for five minutes resulted in a golden brown product which was firm, crisp, and of good flavor. Although the interior was white and flaky there was evidence of slight greasiness.

This work is being conducted in cooperation with the Division of Fruit and Vegetable Crops and Diseases of the United States Department of Agriculture.—*E. A. Fieger and L. E. LeClerg.*

Variety Studies

Strawberries

For the past three years recognized varieties as well as seedlings developed by the Horticulture Department have been organoleptically tested for adaptability to freezing preservation. Of the varieties used most commonly in the state, Konvoy rated best each year, Klondike second best, and Klonmore third.

Peaches

Eight varieties of peaches obtained from the North Louisiana Experiment Station were tested this past season for adaptability to freezing preservation. The peaches were steamed, peeled, pitted, sliced, and packed with and without added ascorbic acid, in cellophane bags in end-opening cartons with overwrap. Each package contained 300 grams peaches and 100 grams 60 per cent cane sugar syrup.

The addition of 270 milligrams of ascorbic acid (vitamin C) per package resulted in a product which had a much superior appearance and a better flavor.

The varieties were rated by six judges for the two methods of preparation as follows:

<i>Rating</i>	<i>Without Ascorbic Acid</i>	<i>With Ascorbic Acid</i>
1	Elberta	Hale
2	Early Elberta	Elberta
3	Hiley	Hiley
4	Hale	Early Elberta
5	Belle of Georgia	Belle of Georgia
6	Vidette	Vidette
7	Hale Haven	Hale Haven
8	Golden Jubilee	Golden Jubilee

—*E. A. Fieger and Martha E. Hollinger.*

Agricultural Economics



Economic Aspects of Peach Production in Louisiana

The production of peaches is concentrated in the northern, hilly section of Louisiana, where they have been grown for many years. The declining importance of cotton as a cash crop has stimulated commercial development significantly. The need for developing new enterprises is primarily responsible for the keen interest in peach production possibilities of the area.

The Cost of Establishing Orchards

The production of peaches requires high capital investment per acre in comparison with most other farm crops. Peach trees do not normally bear the first crop until the fourth year. The cost of establishing an acre of peaches on mechanized and non-mechanized farms under two different price levels, 1944 and 1935-39, is shown in Table 1. The establishment costs were slightly higher on mechanized farms than on non-mechanized farms. As a rule orchards on mechanized farms were handled more carefully and better practices were carried out in regard to cultivation, fertilization, cover crops, and other orchard practices.

TABLE 1. COST OF ESTABLISHING AN ACRE OF PEACHES IN THE NORTH LOUISIANA UPLAND COTTON AREA

<i>Period</i>	<i>Mechanized Farms</i>		<i>Non-Mechanized Farms</i>	
	<i>1944 Prices</i>	<i>1935-39 Prices</i>	<i>1944 Prices</i>	<i>1935-39 Prices</i>
	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
First year	38.53	29.92	38.22	27.59
Second year	31.29	22.27	22.92	15.09
Third year	32.57	23.49	26.79	17.51
Total for 3 years	102.39	75.68	87.93	60.19

Costs and Returns from Orchards in Production

The data on cost and returns shown in Table 2 are based on methods of orchard management as practiced by commercial producers and do not in all cases represent desirable or recommended practices. Produc-

tion costs per acre were higher on mechanized farms than on non-mechanized farms, but costs per bushel were lower because of higher yields. Returns from the enterprise were larger on the mechanized farms, where better orchard practices were generally followed.

TABLE 2. COSTS AND RETURNS OF THE PEACH ENTERPRISE IN THE NORTH LOUISIANA UPLAND COTTON AREA

Item	Mechanized Farms		Non-Mechanized Farms	
	1944 Prices	1935-39 Prices	1944 Prices	1935-39 Prices
	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Production costs per acre.....	80.96	52.48	69.55	43.12
Average cost per bushel.....	0.76	0.51	0.83	0.54
Average price per bushel.....	2.62	1.09	2.62	1.09
Net returns per bushel.....	1.86	0.58	1.79	0.55
Net returns per acre.....	196.76	58.70	150.53	44.08
Average returns per hour of labor.....	1.96	0.63	1.66	0.52
Average yield per acre in bushels.....	106	102	84	80

Observations and Recommendations

From the standpoint of resources, peaches can be produced commercially in the northern part of Louisiana. State average yields are below national average yields, .75 bushel per tree as compared with 1.25 bushels per tree in the period 1940-44. The relatively low state average occurs because 55 per cent of the peaches produced in Louisiana are for home consumption and are produced in home orchards under poor management practices. The average yield per tree in commercial orchards was slightly over 1 bushel, and yields can be further increased by following

desirable orchard practices. The farm price of Louisiana peaches has been less than \$1.00 a bushel only one year since 1916 and has generally been higher than the United States farm price.

The development of the enterprise affords many farmers an opportunity for achieving better utilization of the farm resources. Land and equipment that are not fully utilized may be put to productive uses. Peaches are an intensive labor crop, and farm labor is provided with employment when other farm work is not pressing. Managerial requirements are exacting, but there appears to be ample managerial capacity for further development of the enterprise commercially. Since peach production is expanding commercially, it is essential that effective methods of grading, packaging and selling be developed. Emphasis on marketing phases is as important as production in the development of the enterprise in Louisiana.—*Frank D. Barlow, Jr.*

The Mechanization of Cotton Production in Upland Areas

There has been a tendency to underrate the possibilities afforded by mechanization in the upland sections as compared with delta areas and other areas with relatively smooth topography. The data on requirements, income, costs and returns, for different power systems indicate that considerable economies are possible in cotton production in upland areas.

REQUIREMENTS, INCOME, COSTS AND RETURNS PER ACRE OF COTTON UNDER DIFFERENT POWER SYSTEMS, NORTH LOUISIANA UPLAND COTTON AREA, 1944

Item	Mule Power	Tractor Power	
	One-half row equipment	One-row equipment	Two-row equipment
Total pre-harvest man labor (hours)	45.5	24.3	20.5
Total man labor (hours)	82.3	60.4	56.6
Total mule work (hours)	38.9	....	....
Total tractor work (hours) . . . . .	....	9.8	6.0
Gross income per acre	\$50.10	\$50.10	\$50.10
Total pre-harvest operating expense	28.27	19.76	16.96
Total operating expense	41.36	32.23	29.43
Net return per acre	8.74	17.87	20.67
Return to labor per acre	27.76	31.96	33.62
Return to labor per hour	0.34	0.53	0.59
Reduction in operating expense by using tractor power . . . . .	....	9.13	11.93
Percent reduction in operating expense by using tractor power . . . . .	....	22.1	28.3

Man labor requirements prior to harvest are reduced 25.0 hours an acre when two-row tractors replace mule power and 21.2 hours when one-row tractors are used instead of mules. Sizable reductions in man labor requirements are obtainable even though tractors are used only for land preparation. The timeliness in performing operations with tractors results in additional advantages. Hand labor is still required for hoeing and picking, but experimental results with flame cultivators, mechanical choppers, and mechanical pickers indicate that further improvements may eliminate more hand work in cotton production.

Operating expenses were reduced from \$41.36 where mules were the source of power to \$32.23 with one-row tractors and \$29.43 with two-row tractors. The percentage reduction in operating expenses was 22.1 per cent where one-row tractors replaced mule power and 28.3 per cent where two-row tractors were used.

Returns to labor were higher with mechanical power. At 1944 price-cost relationships, cotton returned 34 cents an hour to man labor when mules were used, 53 cents when one-row tractors were used, and 59 cents when two-row tractors were used.

Farm mechanization affords many opportunities for improving the status of upland farmers, especially in regard to increasing production efficiency and lowering production costs. The labor and other resources, such as land for raising feed that is normally fed to workstock, which are released through mechanization may be utilized advantageously in expanding other productive farm enterprises. Expanded and diversified systems which obtain better distribution and fuller utilization of farm labor are encouraged by mechanization and should result in increasing net farm incomes on mechanized farms.

—*Frank D. Barlow, Jr., and Leo J. Fenske.*

Tractors on Upland Farms in North Louisiana

The trend in recent years toward mechanization has been rapid in the hill sections of Louisiana. The number of tractors in the North Louisiana upland cotton area increased from 41 in 1925 to 104 in 1930, 288 in 1940, 474 in 1942, and 661 in 1944.

Results from research on farm mechanization in the upland area for 1944 show that machinery inventory values averaged \$2,365 per farm of 135.5 acres in cropland. Of the total machinery investment, 78 per cent was for tractors and tractor equipment and 22 per cent was for mule-drawn equipment. The annual cost of operating tractor equipment (exclusive of tractors, hay balers, combines, and peanut pickers) was \$160 per farm. The annual cost of operating mule-drawn equipment was \$128 per farm.

Tractor operating costs in 1944 averaged \$4.22 per 10-hour day of use for all tractors, consisting of \$2.98 for cash expenses and \$1.24 for overhead costs. One-row tractor costs averaged \$3.88 per 10-hour day; two-row tractors of less than 17 drawbar horsepower, \$4.05 per day; and two-row tractors of 17 horsepower and over, \$4.87 per day. Workstock costs averaged 22 cents an hour of use at 1944 prices.

This study revealed that on an average each tractor in operation displaced 3 mules. Farmers estimate that when tractors are fully utilized, one tractor accomplishes as much work as 4 to 8 mules or an average of 6. The number of mules has not been reduced to a minimum; hence, over-all power costs on many farms can be reduced still further.

The man labor requirements for crop production were substantially less where mules were replaced with mechanical power. Reductions in man labor requirements per acre through the use of tractors ranged from

25 to 60 per cent, depending upon the crop and the extent of mechanization. The most significant reductions occurred in pre-harvest operations, because harvesting operations for most crops have not yet become fully mechanized.

Production costs were reduced through the use of tractors, and the returns to labor for each selected crop were greatest when operations were highly mechanized as compared with mule production methods. In 1944 cotton returned 34 cents an hour to labor when mules were used for power and 59 cents an hour when two-row tractors replaced mules; corn returned 3 cents and 29 cents an hour, respectively; sweet potatoes 58 and 68 cents; and peanuts 44 and 73 cents. Other crops show similar relationships.—*Frank D. Barlow, Jr., and Leo J. Fenske.*

Cost of Operating Tractors and Other Mechanical Equipment in Delta Areas of Louisiana

Tractors and Tractor Equipment

The average cost of operating the 179 tractors was \$5.58 per 10-hour day in 1944. The number of 10-hour days of use per year for all tractors was 94.8. Tractors on rubber were used 103.6 days and those on steel were used 78.5 days per year.

The inventory values of tractor equipment excluding combines and hay balers averaged \$1,418 per farm, ranging from \$444 on farms with less than 50 acres in cropland to \$2,657 on farms of over 300 acres. The annual cost of repairs, depreciation, and interest for tractor equipment per farm was \$289, ranging from \$85 per farm with less than 50 acres to \$566 for farms with over 300 acres of cropland. The average cost of equipment per acre for all farms was \$1.28 and per hour of use, 18.5 cents.

COST OF OPERATING TRACTORS IN THE MISSISSIPPI RIVER DELTA COTTON AREA, 1944

Size	Rubber Tires			Steel Rims		
	Tractor	Average drawbar horsepower	Cost per 10-hour day	Tractor	Average drawbar horsepower	Cost per 10-hour day
	Number	Number	Dollars	Number	Number	Dollars
Small.....	14	16.04	4.98	4	14.14	4.48
Medium.....	58	24.13	5.31	49	22.93	5.64
Large.....	42	31.65	5.85	12	29.85	6.88
All tractors.....	114	25.91	5.48	65	23.67	5.80

Combines and Hay Balers

The annual cost of operating thirty-one 60-inch combines with the power take-off was \$171.45, of which \$49.83 was for repairs and upkeep, \$97.14 for depreciation, and \$24.48 for interest. In 1944, 99 acres were harvested per machine and the average annual cost of combines per acre was \$1.73. The cost of man labor and the tractor is not included. The cost of operating thirty 60-inch combines with auxiliary motors was \$232.49, of which \$43.39 was for repairs and upkeep, \$130.23 for depreciation, \$33.60 for interest, and \$25.27 for operating costs of the auxiliary motor. In 1944, 119 acres were harvested per machine and the average annual cost of combines per acre was \$1.95. The cost of man labor and the tractor is not included. The efficiency in harvesting gained by using combines with an auxiliary motor more than offsets the higher costs of operation.

The annual cost of operating hay balers in 1944 varied considerably with the type of baler. The annual cost of operating 5 stationary balers without an auxiliary motor averaged \$33.69 in 1944, of which \$8.00 was for repairs and upkeep, \$17.68 for depreciation, and \$8.01 for interest. An average of 97 acres was baled per machine and the per acre cost was 34 cents. The annual cost of operating 21 stationary balers with an auxiliary motor averaged \$54.32 in 1944, of which \$10.75 was for repairs and upkeep, \$29.44 was for depreciation and \$14.13 was for interest. An average of 102 acres was harvested per baler and the per acre cost was 53 cents. The annual cost of operating 12 pick-up balers (3 men) averaged \$164.32, of which \$28.08 was for repairs and upkeep, \$104.56 for depreciation, and \$31.68 for interest. An average of 164 acres was harvested per baler and the per acre cost was \$1.00. The higher cost of operating pick-up balers is offset by increased labor efficiency which results in lower harvesting costs per acre and per ton of hay.

—Frank D. Barlow, Jr., and Leo J. Fenske.

Farm Management and Cost Studies

Sugar Cane Mills

The costs of manufacturing 100 pounds of raw sugar varied from less than \$3.00 per hundredweight in the 1937-41 pre-war period to \$3.29 in 1942, \$3.45 in 1943, and \$3.81 in 1944. The net profit per hundred pounds varied from \$0.42 per hundredweight in 1941 to \$0.34 in 1942, \$0.28 in 1943, and a loss of \$0.08 in 1944. The relatively high costs and low returns in 1944 as compared with the three previous years were due to the fixed price of sugar and increasing costs for labor and materials and a relatively low yield of sugar per ton of cane as obtained in 1944.

The analysis of wage rates paid indicated that a 65 cent minimum wage under 1944 conditions will result in a further increase in costs of \$0.27 per hundredweight of raw sugar produced and that the elimination

of the overtime-pay exemption during the grinding season will increase costs an additional \$0.15 per hundred pounds of raw sugar.

Large Sugar Cane Farms

Total costs of producing sugar cane on large farms varied from \$4.59 per ton in 1941 to \$5.93 per ton in 1944. Receipts increased from \$4.21 per ton to \$6.58 during the same period. Because of higher prices received for sugar cane, including government payments of various types, net incomes per farm and per ton of cane were higher during the war years of 1942-44 than in any of the five preceding pre-war years.

Small Family-type Sugar Cane Farms

The costs for growing and harvesting a ton of sugar cane on family-type sugar cane farms in Louisiana varied from \$3.78 per ton in 1938 to \$4.69 in 1943 and \$6.14 in 1944. The rapid increase in costs from 1943 to 1944 was due to increased costs for input items, mostly hired labor and machinery, and to lower than average yields obtained in 1944. These farmers incurred a loss of about 8 cents per hour of man labor in 1938 and 1940, earned about 40 cents per hour in 1942 and 1943, and made about 10 cents per hour in 1944. In pre-war years, with relatively low labor costs, the small farms produced cane cheaper than the large farms. In 1944, with high labor costs and the difficulty of mechanizing on small farms, the large farms produced a ton of cane about \$0.20 per ton cheaper than the small farms.

Milk Production Costs

The cost of producing milk in the Southeast Louisiana, or Florida Parishes, dairy area was about two and one-half times as great in early 1946 as in the pre-war year 1938. Total costs per hundredweight of milk produced averaged \$2.18 in 1938, increased to \$4.65 in 1944, and to \$5.41 in February, 1946.

The return per hour of labor on the dairy enterprise in the region is indicated to be about 20 cents for 1946, based on relative prices and costs in February, 1946. This means that the farmers in the area have the prospect of making a net return of 20 cents for each hour of labor in producing milk but are having to pay an average of 40 cents per hour for all labor hired. With this situation, a declining trend in the production of milk in the area is to be expected.

Sweet Potatoes in Northwest Louisiana

The sweet potato enterprise in Northwest Louisiana was relatively profitable in 1943, returning 47 cents per hour of man labor and bringing higher returns over all expenses per acre and per hour of man labor than cotton, peanuts, or corn. Also, under long-time average conditions, sweet potatoes in this region are indicated to be in a strong competitive position when compared with cotton, peanuts, and corn.

—J. Norman Efferson.

Wartime Production Capacity on Louisiana Farms

The wartime demands for food, oils and fiber were indicated by means of annual production goals, and production was implemented by educational programs, price floors, and subsidy payments. The first step in the goal-making process was an annual preview analysis of the production possibilities in each of the 48 states. In Louisiana this work was done by a committee composed of workers in the Experiment Station, the Agricultural Extension Division, and the United States Department of Agriculture. The first production capacity report was prepared in 1942 and the current one during the summer of 1945.

TABLE 1. 1946 CROP PRODUCTION GOALS WITH COMPARISONS, LOUISIANA*

<i>Crop</i>	<i>1944 reported</i>	<i>1945 reported</i>	<i>1946 goal†</i>	<i>% 1946 goal is of 1945</i>
	<i>1,000 acres</i>			
Corn.....	1,319	1,187	1,200	101
Cotton.....	938	866	1,000	115
Sugar cane (sugar and seed).....	268	269	288	107
Rice.....	568	584	584	100
Sweet potatoes.....	109	124	109	88
Irish potatoes.....	68	46	52	113
Oats.....	210	225	275	122
All tame hay.....	295	290	500	172
Soybeans for beans.....	29	28	25	89
Peanuts for nuts.....	8	7	5	71
Sorghums, all except sirup.....	15	13	15	115

*La. D. A. E. Mimeographed Circular No. 51, July 1945.

†Production and Marketing Administration.

The estimates of maximum production indicate that the acreages of cotton, oats, tame hay, Irish potatoes, and sugar cane could be increased in 1946 (Table 1). The suggested acreages for corn, rice, and truck crops are about the same as the 1945 acreages. The report stresses the need for a greater acreage of improved pastures and increased production of feed crops as a basis for the further expansion of livestock production.

Louisiana is a deficit state in the production of all classes of livestock, and it is recommended that livestock numbers should expand as feed production increases. This is a long-range program; hence dairy cattle, beef cattle and sheep numbers in 1946 should remain at about 1945 levels (Table 2). A small increase in sows to farrow in 1946 should take place because heavy marketing of all classes of hogs in late 1944 and 1945 greatly reduced the numbers of brood sows. A decrease in poultry was suggested for 1946.—*Leo J. Fenske and B. M. Gile.*

TABLE 2. 1946 LIVESTOCK PRODUCTION GOALS WITH COMPARISONS,
LOUISIANA*

<i>Livestock and livestock products</i>	<i>Unit</i>	<i>1944 reported</i>	<i>1945 reported</i>	<i>1946 goal†</i>	<i>% 1946 goal is of 1945</i>
<i>1,000 units</i>					
Milk cows‡	Number	296	299	296	99
Milk production	Pounds	696,000	709,000	710,000	100
Hens and pullets	Number	5,746	4,926	4,286	87
Chickens raised	Number	8,593	9,452	8,215	87
Eggs produced	Dozen	34,500	31,917	27,235	85
Turkeys	Number	69	69	69	100
Cattle and calves	Number	1,418	1,461	1,461	100
Sheep and lambs	Number	258	253	240	95
Sows to farrow (spring)	Number	143	119	125	105
Bees (colonies)	Number	68	75	79	105

*La. D. A. E. Mimeographed Circular No. 51, July 1945.

†Production and Marketing Administration.

‡Average number on farms during year.

Cottonseed Marketing

A study of the marketing of cottonseed in Louisiana during the 1943-44 season shows that local ginnerers purchased 87.1 per cent of all cottonseed. Farmers retained 7.2 per cent as planting seed, 2.4 per cent as feed for livestock and fertilizer and 3.3 per cent for sale as planting seed. The value of cottonseed was over 15 million dollars. Cottonseed alone ranked sixth in value among the major field crops grown in Louisiana and its value is about 18 per cent of the total income from the cotton crop. Many farmers use some seasonal credit in production, and the first bales of lint cotton sold are obligated in payment of these debts. For these farmers, the income from cottonseed provides the cash needed to pay the cash costs connected with the cotton harvest.

Oil mills paid a minimum price of \$56 a ton for cottonseed with a base grade equal to 100, with premiums and discounts for seed of other grades. Ginnerers determined the price to be paid to growers by deducting a handling margin from the price received from oil mills. Average margins taken by ginnerers varied from —\$0.69 to \$8.40 a ton. The main causes of the wide variations in margins were associated with: (1) the use of different methods in calculating weights of cottonseed; (2) variation in prices for cotton lint and absorbing losses from cottonseed; (3) methods used in making seed settlements with growers; (4) charging a low price for ginning services and taking above average margins on cottonseed; and (5) the degree of competition among gins. The adoption of more uniform trade practices would tend to reduce the present wide variations in margins taken by ginnerers.

—James F. Hudson and B. M. Gile.

Cotton Marketing

The Louisiana Agricultural Experiment Station cooperates with the Production and Marketing Administration in providing a free cotton classing and market news service for eligible producers in Louisiana. This service is provided for by a federal law, commonly known as the Smith-Doxey Act. The free cotton classing service has increased the effectiveness of farmers in bargaining for the sale of their cotton. The growing of better grade and staple cotton is encouraged when farmers are able to sell such cotton for the higher price which it commands.

Twelve new cotton improvement groups were formed in 1945. The number of parish wide groups increased from 11 during 1944 to 23 in 1945. The acreage of one-variety cotton increased from 277,567 in 1944 to 389,184 in 1945. By February 1, 1946, 60,289 bales of the 1945-46 crop had been classed for marketing purposes, or 15.3 per cent of the estimated total state production, as compared with 64,876 bales, or 10.9 per cent, during the 1944-45 season. The general participation of farmers in the program is increasing rapidly in Louisiana.

—*James F. Hudson and B. M. Gile.*

Prices and Statistics¹

The general level of prices received for agricultural products by Louisiana farmers increased steadily through 1945. The composite index of prices received by farmers rose from 133 in December, 1944, to 145 in December, 1946 (1925-29=100). Demand for agricultural products continued strong throughout the year. Volume of production of basic agricultural commodities was high for products other than cotton and cottonseed.

Prices paid by farmers continued to rise slowly during 1945. The ratio of prices received to prices paid changed very little during the year. Total cash receipts from farm marketings in Louisiana were approximately the same in 1945 as in 1944.—*J. P. Montgomery.*

¹ Basic data are obtained through a cooperative agreement between the Louisiana Office of the Division of Agricultural Statistics, Bureau of Agricultural Economics, U. S. D. A., and the Agricultural Experiment Station.

Agricultural Engineering

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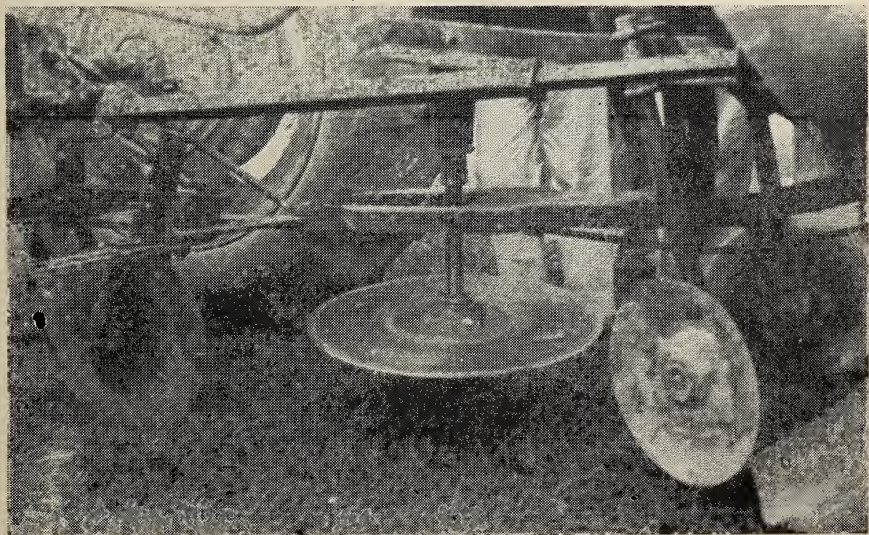
Sweet Potato Machinery and Equipment

Hotbeds

Experiments carried out on hotbeds using electric cables and lamps as a source of heat indicate that lamps are a more economical source of heat and will give just as early plants as cable-heated beds. Cloth covers also proved to be as satisfactory as glass sash. Even though cloth covers would have to be replaced every third season, the initial cost is very low as compared to glass sash, and cloth can be made to fit any size or shape bed. While manure-heated beds gave a larger total number of plants, the plants were produced in quantity later than with the electric cable or the electric lamp beds. Further study will be made on optimum placement and spacing of both cables and lamps for sweet potato hotbeds.

Harvesting

A standard 26-inch potato digger has been modified to include a vine cutting attachment. This machine has been used successfully for the



Vine Cutting Attachment for Sweet Potato Digger

past two seasons to dig sweet potatoes in one operation. Harvesting studies during this period indicate that the mechanical digger can dig potatoes in about one-half the time required by the moldboard plow and increase the quantity of marketable potatoes harvested by 20 per cent, and also increase greatly the total (including culls, etc.) potatoes dug. These culls and unmarketable potatoes can be dehydrated for stock feed. It is estimated that a farmer owning his own tractor can pay for a mechanical digger from increase in harvested potatoes alone in the first 20 to 30 acres dug. The mechanical digger is desirable in the control of weevils as it exposes the entire potato plant, allowing the plant to decay. A smaller tractor-mounted mechanical digger is being designed and will be tried during the 1946 season. This type of digger is particularly desirable for the small farmer desiring a lower first-cost machine and also one that can be handled more easily in smaller fields.

Dehydration

The artificial drying of unmarketable sweet potatoes for livestock feed has gained considerable prominence in the past few years. Approximately 10 small community dehydrators were installed during the 1945 season under the supervision of the Experiment Station.

Counter-flow drying with a direct-fired drier was tried this past year, and results indicate that while such a method may improve the quality of the product, it cuts down on the capacity of the drier. This arrangement also necessitates considerable change in the drum fins of the present driers, or the drums must be elevated to a suitable height to allow the product to feed by gravity against the air flow. A new method of feeding the raw material into the direct-fired, parallel-flow drier is contemplated for trials for the 1946 season. This is to prevent burning of the fine material as it is fed into the hot part of the drum next to the furnace.—*Leland E. Morgan and Wiley D. Poole.*

Flame Cultivation

Butane and propane flame cultivators of one, two, three and four rows were worked with during the 1945 season. In both laboratory and field the propane machine gave a higher flame temperature, better flame pattern, and a more economical machine both in first cost and cost of operation. The burner is the most important part of the machine in order to get a proper flame.

After designing and testing 12 homemade and commercial burners a burner was designed that is very simple and gives the best weed kill of any burner tested, with an economy of fuel.

One-row propane machines can be operated without a special gasifier; but with more than two burners it is recommended that a special gasifier be used to maintain pressure at the burners, especially if butane or a mixture of butane and propane is used.—*Harold T. Barr.*

The Effect of Organic Matter, Deep Plowing, and Vegetable Cover on the Runoff, Erosion, and Crop Yields of the Lower Mississippi Loessial Soils

This is a cooperative project between the Agricultural Engineering Department of Louisiana State University and the Division of Water Control and Drainage, Soil Conservation Service, U. S. Department of Agriculture.

In a rotation of cotton, cotton and corn the common practice is to reverse the rows, plowing about six inches deep. Half of this project was plowed twelve inches deep, thoroughly mixing the top soil with the six inches of subsoil directly under it. Bringing up this new soil reduced the cotton yields to a small degree. The cover crop and deep plowing increased crop yields and decreased soil loss as shown by the following table.

<i>Cotton Lbs./A</i>	<i>Soil loss Lbs./A.</i>	<i>% Organic Matter</i>	<i>Water Loss Inches/A.</i>	<i>Treatment</i>
707.85	2946.79	1.01	13.24	Deep plowed (12") 10/24/44—No winter cover crop.
843.70	5277.12	1.09	20.23	Plowed 6"—No cover crop.
1327.03	2179.08	1.18	8.47	Deep plowed (12") 10/24/44—Winter cover crop.
1370.38	4045.27	1.22	14.65	Plowed 6"—Winter cover crop.

—*Harold T. Barr and C. T. Dowell*

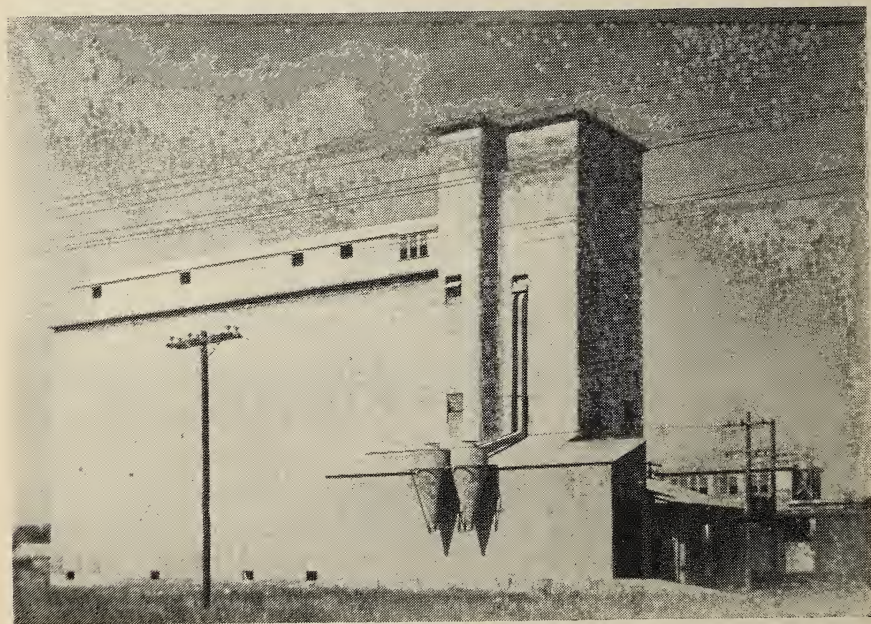
Rice Storage

Observations made for the past two years on rice stored in steel bins indicate that this material may be satisfactorily used for bin construction, particularly where the steel bin is housed within a steel or other type structure. It is not recommended that rice be placed in any type of bulk storage at temperatures above that of the average atmospheric temperature for that period, because of the tendency for moisture to move away from the warm interior and to accumulate near the colder bin walls. The temperature of rice in storage should be checked frequently, because where an increase in temperature does occur, due to improper condition of the rice, further increases in temperature usually occur at a much more rapid rate.—*Harold A. Kramer.*

Rice Drying

Data were collected on 79,000 barrels of rough rice dried by the Crowley Rice Drier Co-op, Inc. during the 1945 drying season. The total average number of individual dryings required to dry the different varieties varied as follows: Blue Rose 5.6, Early Prolific 5.6, Nira 4.0, Fortuna 3.3, Zenith 2.8, Rexora 2.6. These data do not necessarily indicate the relative difficulty of drying by variety, as the initial moisture content of the combined rice varied considerably during the season. The average moisture loss by weight for all varieties was 9.5 per cent.

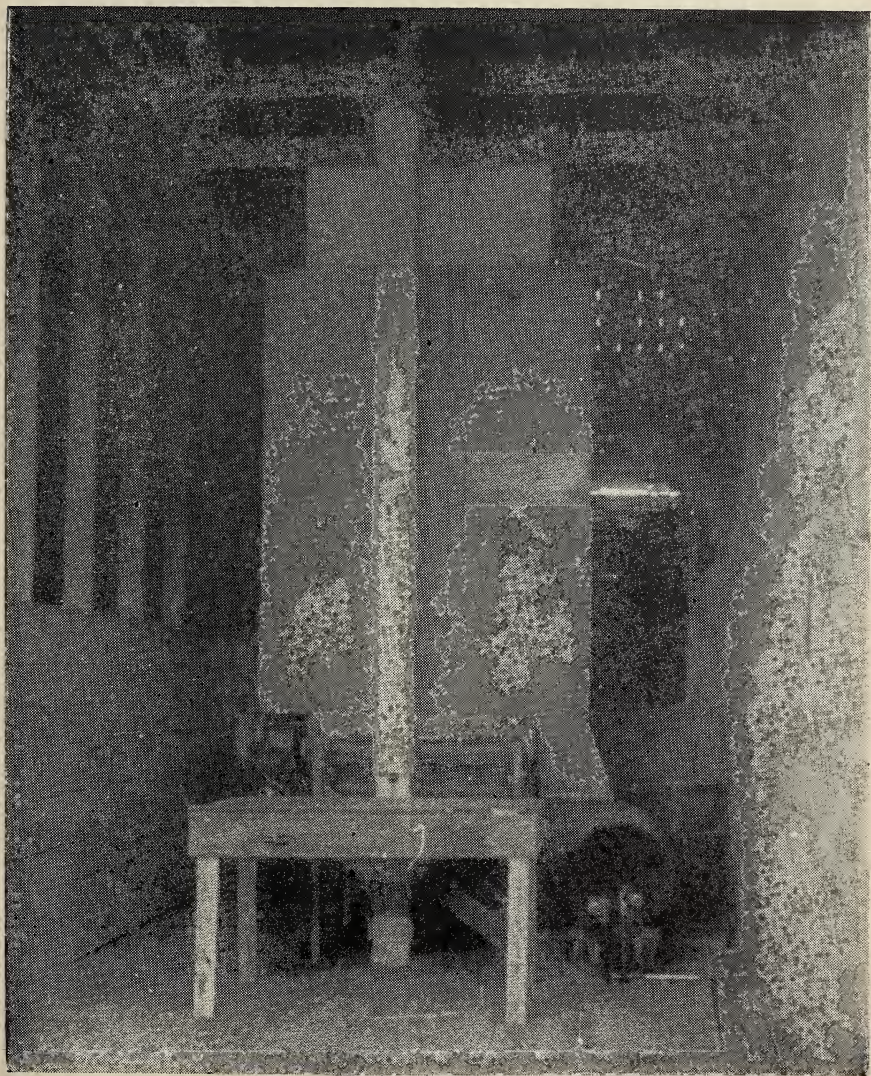
Best milling results were obtained when the temperature of the rice leaving the drier was not allowed to exceed 100 degrees Fahrenheit. This temperature was obtained with a thermometer placed in the rice sample obtained as it was leaving the drier. It was found advisable to limit the time between dryings to a maximum of 12 hours until the moisture has been reduced to 18 per cent or less.—*Harold A. Kramer.*



Farmers Cooperative Rice Drying Plant at Crowley

Oat Drying

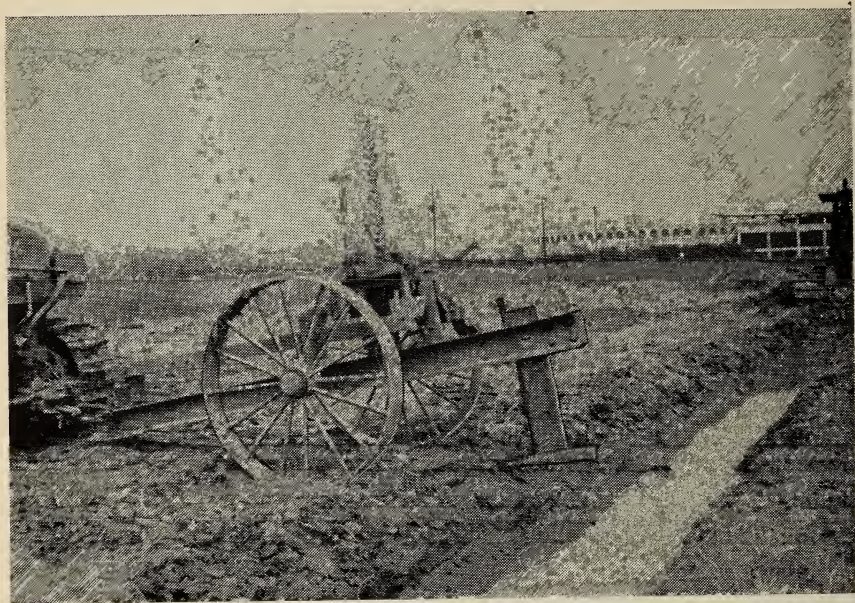
Experimental work indicates that the excess moisture in oats, often present at harvesting time, can be efficiently removed by passing the oats through a drier. Usually only one drying period of from 20 to 30 minutes duration is required to bring the moisture down to 14 per cent. Tests showed that the germination of the artificially dried oats was equal to that of other oats.—*Harold A. Kramer.*



Experimental Oat Drier

Mole Drainage of Sugar Cane Land

Mole drainage of sugar cane land near the Mississippi River has resulted in a lowering of the water table, a more rapid removal of surface runoff, and increased yields of both sugar cane and corn. Sufficient data on life of mole drains and cost of installation are not available to date to recommend their general installation.



Mole Machine, Showing Mole

Both the plow beam dragline bucket, developed last year in connection with this project, and the side sloping bucket are meeting with general approval. Several plantations and earth moving contractors have bought dragline buckets made along these lines.

Grading the cuts to the center with approximately one-foot crown and removing the high mound of dirt on the ditch bank doubled the corn yield in a 24-acre test. Work is now under way to obtain figures on the most economical method of moving the dirt.

This is a cooperative project between the Division of Water Control and Drainage, Soil Conservation Service, U. S. Department of Agriculture, and the Agricultural Engineering Department of Louisiana State University.—*Irwin L. Saveson.*

*Animal Industry*¹

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Breeding and Selection of Swine For Increased Production

Six new sows qualified for Production Registry in 1945, representing three separate families. L. E. S. Maxine 6th qualified with two of her daughters and L. E. S. Actina 3 qualified with one daughter. All five of these sows are descended from Wave Queen 7th, 236890, a two-star Production Registry sow. L. E. S. Patrician 44, the latest sow to qualify, is a granddaughter of Golden Wave 111th, 206492, a three-star Production Registry sow. The Duroc herd placed third in the 1945 National Duroc Production Registry contest.

Three young sires, raised in the herd, were used in 1945. These were L. E. S. Top Ace 26, sired by a litter mate to L. E. S. Maxine 6th; L. E. S. Marshall 19th, by the same sire and out of Farmers Best 116, a two-star Production Registry sow; and L. E. S. Fancy King 13, 203689, a litter mate to L. E. S. Fancy Actress 13, a Production Registry gilt out of L. E. S. Actina 3.

These production-bred sows are of excellent type and their pigs usually make rapid gains. Five pigs out of a Production Registry litter from L. E. S. Fancy Actress 13 made high average gains in the summer feeding tests.—*Chas. I. Bray.*

Effects of Management and Seeding on Beef Cattle Pastures

Grazing continued on six experimental six-acre pastures on river bottom land. Gains per acre were lower than in 1944, due possibly to the heavy rainfall during the summer as well as to the increasing growth of grass in proportion to clover. The most important item of interest is the continued decrease in the productivity of the No. 3 pasture which has not been renovated since the pastures were established in 1938. The gains on this lot were only 82.5 pounds per acre compared with 217 pounds per acre on pastures which were disced in 1944. Three out of five heifers on this pasture were losing weight toward the end of the

¹ See page 116 for report on Animal Industry project at the North Louisiana Experiment Station.

grazing period and were found to be suffering from internal parasites. Field 6, which was plowed two years ago and which made the highest gains in 1944, made lower gains in 1945 than those which had been disced only.—*Chas. I. Bray and S. E. McCraine.*

Pasture Improvement and Winter Grazing in the Rice Area²

Winter grazing was conducted on winter oats, Italian rye grass, and native grass pastures.

Twenty head of steers were grazed on 20 acres of winter oats and made an average gain of 106 pounds each, or 106 pounds gain per acre. Fourteen steers were grazed on 20 acres seeded to Italian rye grass and made 97 pounds gain per head, or a gain of 68 pounds per acre. Twelve steers grazed on 20 acres of native grass pasture containing some clover, made 113 pounds gain per head, or 68 pounds per acre. There was apparently no advantage in seeding with Italian rye grass. Winter oats to be of greatest value should be put in early so as to furnish grazing at a time when there is very little grass.

Fecal examinations made to determine the amount of parasite infestation have been entirely negative, as none of the cattle appear to show any degree of infestation with stomach worms, whether pastured on recently plowed land or on old unplowed pastures.

—*Chas. I. Bray and J. Lane Fletcher.*

Soybean Meal and Peanut Meal as Protein Supplements for Fattening Pigs

Work has been continued on the feeding value of soybean oil meal and peanut oil meal in various combinations for fattening swine. In a winter feeding experiment, soybean oil meal and tankage produced the best gains, with peanut meal and tankage second and soybean oil meal third. Peanut meal alone was not satisfactory from the standpoint of gains, but as it cost around \$9.00 per ton less than soybean oil meal, there was little difference in cost per pound of gain.

A second test conducted in the summer was planned to compare soybean oil meal and peanut oil meal with and without pasture. Owing to continuous rainfall during the summer, considerable grass grew in the dry lot and consequently there was no difference in the gains. Gains were identical in three of the lots, the peanut meal lot on grass making slightly lower gains. A melting point test on fat samples from some of the barrows showed the peanut meal lots to be slightly softer than the lots fed soybean oil meal.

² In cooperation with Swift & Co., Lake Charles.

In the winter test a fifth lot was fed dried shredded potatoes, dried in a flame drier. One hundred and nine pounds of dried potatoes replaced 88 pounds of corn, giving the dried potatoes a value of 81.5 per cent the value of corn. This lot ate a slightly higher amount of protein supplement.—*Chas. I. Bray and J. L. Fletcher.*

Fertilized Pastures on Old Rice Land³

Two-year old cattle were pastured on six 10-acre, unplowed fields and on one plowed field, limed and fertilized in various ways. There were not enough cattle to keep the grass down, especially on the 1B field; consequently there was not as much difference between pastures as there probably would have been had the lots been completely grazed.

Lot	Treatment	March 29—Oct. 2, 1945			Grade of Cattle at Finish
		No. of Cattle	Gain per Head	Gain per Acre	
Lot 1B	Plowed, seeded, limed, fertilized.	7	204	..	1 good, 6 commercial
Lot 1	No treatment.	4	197	79	1 commercial, 3 utility
Lot 2	Lime, calcium metaphosphate 100 lb.	7	188	132	2 good, 3 commercial, 2 utility
Lot 3	Superphosphate 300 lb.	7	186	130	3 commercial, 4 utility
Lot 4	Lime, complete fertilizer 500 lb.	7	225	157	7 commercial
Lot 5	Ca-metaphosphate 100 lb.	7	225	157	2 good, 5 commercial
Lot 6	Ca-metaphosphate 100 lb. Muriate of potash 100 lb.	7	172	120	4 commercial, 3 utility

The "commercial" grade was formerly known as "medium" and the "utility" grade was low medium to common.

The above gains appear low but were 40 per cent higher than last year. These gains do not include the gains made on winter pastures before March 29, which averaged around 100 pounds per head. Adding the earlier gains, the cattle put on 305 pounds per head during the grazing season and most of the cattle were in good condition for sale in October. Thirty-two of these cattle were shipped to St. Louis at the end of October and brought \$81.39 per head.

The results are not entirely consistent with those of other years. Lot 2, limed, has previously been the better pasture. Judging by the appearance of the pastures, there was no reason why Lot 5, with calcium metaphosphate alone, should have produced better gains than Lot 2, with lime added, or Lot 6, with potash added, except that the cattle in Lot 5 all made uniformly good gains. Lots 1B and 4, with lime and complete fertilizer, appeared to be the better pastures.

—*Chas. I. Bray and J. Lane Fletcher.*

³ In cooperation with Swift & Co., Lake Charles.



Grass Fattened Steers on Fertilized Rice Land Pastures

Raising and Marketing Calves and Yearlings by Various Methods

One group of calves was creep fed on pasture and one group raised on pasture alone. These were all high-grade Herefords. The creep fed calves averaged 426 pounds and the calves on pasture, 358.3 pounds. The appraised price per 100 pounds was respectively \$12.66 and \$11.76, making the total value per head \$53.95 as compared to \$42.64, a difference of \$11.31 in favor of the creep fed calves. These calves were put on feed in dry lot and made an average weight of 588 pounds as compared to 505 pounds. The final values were \$99.23 as compared to \$81.87.

An average of three years of creep feeding shows an average increase in value of \$8.06 per head in favor of creep feeding based on an average increase in price of 98 cents per 100 over the calves on pasture alone. The appraised sale value of the calves at weaning time for three years was \$53.52 for the creep fed calves and \$45.46 for the calves not creep fed.

In 1945 at the end of the winter feeding period, creep fed calves sold at \$103.09 per head as compared to \$82.61. The creep fed calves gained 175.2 pounds as compared to 105.1 pounds of gain for the others, and the difference in selling price was \$1.36 per hundred pounds higher for the calves that had been creep fed.

—S. E. McCraine, Chas. I. Bray and J. B. Francioni.



Creep Fed Calves Finished in Dry Lot Make Good Beef

Hill Land Pasture Investigations

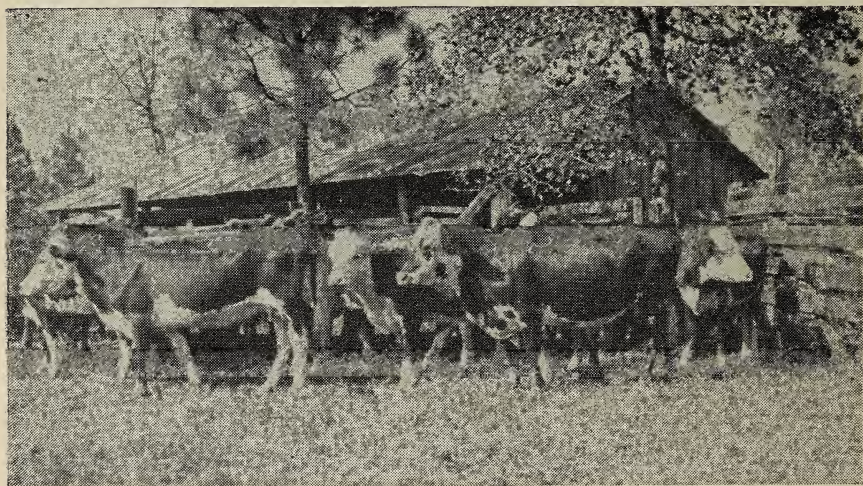
Results on hill land pastures were considerably better than those made in 1943 and 1944, because of greater rainfall throughout the summer. The improved pastures, particularly those that had been limed, showed to better advantage than in any previous year. Cooperative tests were conducted on the farms of E. C. Parker, Ringgold; D. V. Donaldson, Dry Prong; Richard Fuller, Calhoun; and Murphy Gunter, Forest Hill. The following is a brief summary of results on these different pastures.

D. V. Donaldson Farm, Dry Prong

The best results were obtained on the No. 3 pasture which had been both fertilized and limed with two tons of lime to the acre, the total gains being 203 pounds beef per acre from May 10 to October 26. Pasture 1, which was originally fertilized without lime but which received one ton of lime per acre in 1944, made 165 pounds gain per acre. Fertilized woodland, a small portion of which was limed and which received 100 pounds calcium metaphosphate per acre and was seeded only with lespedeza, produced 123 pounds per acre. An unfertilized field which, however, was not grazed to capacity, produced only a small amount of gain. One herd of cattle was grazed on approximately 1,260 acres of unfertilized woodland pasture. Cattle on this pasture gained 108 pounds per head during the summer as compared to 233 pounds per head on the limed field. Calves on the fertilized fields gained 218 pounds from May to October, while the calves on the unfertilized woodland gained 178

pounds per head and were not in as good condition. Young cows with calves and some very old cows with calves coming off the unfertilized woodland were thin and showed some evidence of mineral deficiency.

While the gains on these hill land pastures are not high, they have been made on low priced land which had been badly run down by long continued cropping. Also, these pastures are grazed to a large extent in late fall and early winter, thus saving considerable expense of winter feeding.



Cows from Fertilized Pastures, Grant Parish, October 1945

E. C. Parker Farm, Ringgold

The same four pastures were grazed as were reported on in 1941 to 1944. Pasture 1, limed and fertilized, has continued to increase in productive capacity, making 386 pounds of gain per acre in 1945, which was much more than was made on our alluvial pasture experiments. Pasture 3, fertilized but not limed, produced 255 pounds of gain per acre; Pasture 4, originally fertilized with basic slag but given a treatment of complete fertilizer in 1945, produced 273 pounds gain per acre. Gains on Pasture 2, the unfertilized pasture, are not included because of a breakdown of the watering system, necessitating grazing on fertilized pasture for a period in midsummer. Up to June 12 this group had made 108 pounds gain to the acre as compared to 180 pounds on the limed and fertilized field adjoining.

Richard Fuller Farm, Calhoun

In this experiment 15 acres of limed and fertilized pasture were compared with 10 acres of seeded but unfertilized land. The 10 acres of unfertilized pasture produced 106 pounds of gain per acre on an average

of 4 mature cattle and 2 calves. The fertilized 15-acre pasture produced 282 pounds gain per acre on an average of 14 head of cattle, including 4 calves.

Murphy Gunter Farm, Forest Hill

The fertilized pasture in this experiment consists of cleared woodland which has been limed and seeded, and fertilized annually with 100 pounds of calcium metaphosphate per acre. In 1945, 100 pounds of muriate of potash were also applied and appeared to improve the pas-



Cows from Unimproved Pasture, October 1945

ture considerably. This fertilized pasture of 20 acres carried about 16 cattle of different ages through the summer, with 3 cows added later and 3 calves dropped on pasture. The gain per acre on pasture was 198 pounds, an average of 220 pounds per head. The cattle on open land gained an average of 128 pounds during the summer period. Calves dropped on fertilized pasture during the summer averaged 282 pounds in October and those dropped on unfertilized pasture averaged 245 pounds.—Chas. I. Bray, J. Lane Fletcher and J. L. Heath, Jr.

Special Pasture Investigations

Pasture fertilization tests on Mr. N. L. Moore's farm near Winnsboro in Franklin Parish and on Mr. H. Mitchiner's farm at Epps in West Carroll indicate that the use of calcium, phosphorus, and potash adds profitable production to beef cattle pastures on the soils tested. Clover stands and growth were maintained better on limed areas. An average increase of 155 pounds of beef per acre was obtained from seeded plots receiving lime plus 0-14-7 fertilizer as compared to those not fertilized.

Preliminary results obtained on pasture tests on Mr. H. E. Lyle's farm in Beauregard Parish show that clovers can be grown in the cutover pine lands of that area only when calcium, phosphorus, and potash have been added. During the first grazing season on these tests, 156 pounds of beef per acre were produced on clover-grass pastures which received lime plus 400 pounds of 4-12-8 fertilizer per acre, as compared to only 3 pounds per acre where seeding alone was used. These plots were seeded in November, 1944, and were being grazed for their first season in 1945 and have therefore not reached maximum production. Good grazing was obtained on lespedeza-grass pastures during the first season with the use of 400 pounds of 0-14-7 fertilizer per acre without any soil preparation prior to seeding other than burning native grasses and removing brush and trash. Thorough soil preparation was necessary to secure clover stands.—*D. L. Bornman, Jr.*

Crops and Soils

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A Twelve-Month Grazing Program

In the prairie rice area of southwestern Louisiana rice production and cattle raising are the two most important agricultural enterprises. When the land is not planted to rice, it is allowed to lie idle and grow weeds and grasses which are grazed by beef cattle. This practice has been carried on so long and with so little regard for the maintenance of the fertility of the soil that the yields of rice and beef are too low to support the most profitable agriculture. Research during the past few years has shown that the soils have lost over half of their original amount of organic matter and are low in available nitrogen, phosphorus and potassium. Flooding during the growth of rice and the large surface drainage losses following the removal of the crop increase soil depletion. It is particularly common to find the available nitrogen very low within three weeks after the rice is flooded. In order to provide a high level of available nitrogen throughout the growing period of rice, it was found that increasing the organic matter in the soil could be expected to give the best results. Since there is a shortage of feed for cattle in the area and the production of beef on the extensive unimproved weedy pasture land which is being rotated in rice is somewhat less than 50 pounds of beef per acre per year, obviously the establishment of improved clover and grass pastures would increase the beef production and the rotation of these pastures with rice would restore the soil organic matter. Local observations also indicated that oats planted in early September could be used for supplementary grazing through the winter months.

In order to develop methods for improving pastures and pasture management and to test the value of turning under pasture sods on the improvement of soil fertility, experiments were located in the distinctly different soil areas.

Pasture-rice rotation experiments conducted by the Louisiana Agricultural Experiment Station in three different soil areas of the prairie rice area of Louisiana have shown that a twelve-month grazing program can be developed.

Improved clover-grass-lespedeza pastures have been established on Oberlin silt loam, Lake Charles silty clay loam and Crowley silty clay loam by seedbed preparation, seeding, fertilizing with complete fertilizers

high in phosphorus and potassium, and liming where the pH of the soil is below 6.2. These improved pastures have produced from 172 to 293 pounds of beef per acre during an approximately eight-month grazing period. The yields of the improved pastures exceeded the yields of the unimproved pastures over 150 pounds of beef per acre. The turning under of the improved pasture sods ahead of rice crops in the two experiments that have gone to completion increased the yields of rice 6.4 and 11.1 barrels per acre.

The rotation of improved pastures with rice is definitely the best means found thus far for increasing the yields of rice and for improving the soil productivity of the area.

Supplementary oat and lespedeza pastures rounded out the year-long grazing period and furnished a source of grain and hay which could have further supplemented the mixed pastures during periods of low grazing capacity. The grazing value of the oats as a pasture was 92 pounds of beef per acre during the period from December to March.

When the above practices are fully put to use by the farmers, there will be 40 per cent of the cultivatable land in rice each year, 20 per cent in oats and lespedeza or oats and Alyce clover, and 40 per cent in improved pastures. The adoption of this improved rotation would increase the production of rice on 550,000 acres from 5,830,000 barrels to 8,250,000 barrels. Its adoption would increase the beef production on a like area from 28,000,000 pounds to over 83,000,000 pounds of beef per year. In addition there would be 270,000 acres of winter pastures and a source of grain and hay for winter feeding which would further increase the beef production over 25 per cent. Above all, the fertility of the soils of the area would be improved instead of being depleted.

—R. K. Walker and M. B. Sturgis.

Cotton Still Louisiana's Most Valuable Crop

During recent years cotton has often been condemned and blamed for the various ills with which agriculture in the South is afflicted. Notwithstanding all the criticism, cotton is still our most valuable crop in Louisiana. In 1945, although the shortest crop in many years, the total value was \$51,500,000. The trouble is not with cotton but with its excessive use in a one-crop system rather than as a crop in a well-balanced system of diversified agriculture.

Cotton is still our most important source of cheap, comfortable clothing, accounting for four-fifths of the textile yardage. There is surely dire need for more cheap clothing in the world at present.

It is well known too that there is great need for more edible fats and oils. The light crop of cotton grown in Louisiana in 1945 produced 4,025,000 pounds of oil.

With the increase in amount of livestock being kept on Louisiana farms, the matter of getting feed is becoming a more serious one. The cotton crop in 1945 furnished in the neighborhood of 15,000,000 pounds of feed in the form of cottonseed meal and hulls, the meal being a very rich protein feed especially valuable for cattle.

There are hundreds of uses for cotton and cotton seed products and new ones are being found daily. Even plastics, which are usually considered competitors of cotton, use about 40,000,000 pounds of lint cotton annually.

It is not that there is no need for cotton but a greater need for growing it in a well-balanced system. We should plant in cotton only land adapted to the crop and that will make a bale to the acre on the average. This can be done because many farmers are now getting such yields. Further, yields may be improved and profits increased by planting only good varieties that are adapted to the locality (See data given in Annual Preliminary Report of Crops and Soils Department.); by the use of more fertilizers where needed; and by the use of disease-resistant strains where disease is prevalent.—*H. B. Brown.*

Effect of Fertilizers on Cotton Fiber Quality

It has been reported by several research workers that the use of different chemical fertilizers apparently had no significant effect on cotton fiber quality. We have had a suspicion that probably one reason for such findings was to be found in the methods used in the study. As a rule, bolls for study were selected at random in plots in a field fertilizer test where a commercial variety of cotton had been planted. There was usually the probability of considerable variation in the natural fertility of the land used, variation in supply of moisture in the soil, variation in the staple of different plants in the row even where the treatment was the same, and variation in the staple of different bolls on the same plant depending on the part of the fruiting season during which the boll was developed.

In our experimental setup an effort was made to avoid as many of the suspected errors as possible. Thirty-two small plots were laid off, 18 inches of soil from all of these dug up, hauled to a pile, thoroughly mixed, then replaced on the plots. The top soil and subsoil were, of course, kept separate. A pure line strain of cotton was planted, and fiber from bolls from flowers that opened the same day used for comparison. The fiber length was measured with Hertel's fibrograph machine in the fiber laboratory at Knoxville, Tennessee, and the strength of fibers was determined with Pressley's strength tester in the same laboratory.

Our results showed consistent and significant differences between the staple length of fibers from well fertilized and nonfertilized or poorly fer-

tilized plots. There was a difference in some cases of 5.1 thirty-seconds of an inch in the mean staple length and 4.0 thirty-seconds of an inch in the upper half mean. It was observed, too, that there was a very consistent shortening in fiber length as the season progressed. Fiber from bolls developed the second half of the season was 2 to 5.6 thirty-seconds of an inch shorter than that in early season bolls, and was finer and weaker.

The better fertilizers not only induced longer but stronger and coarser fibers and a higher fiber index.—*H. B. Brown.*

Dallis Grass Improvement and Seed Production

Experiments were continued in 1945 for the purpose of determining the existence of strain differences for seed yields and seed quality in Dallis grass. Seed harvests were made in June, August, and October at Baton Rouge and at Calhoun. The seed were threshed, cleaned, and sampled for analysis. They were analyzed to determine the content by weight of immature seed, viable seed, and ergotized or diseased seed. Total seed yields were somewhat lower in 1945.

The results show striking differences between the strains on test. The value of Dallis grass seed for planting is directly proportional to the content of viable or sound seed. The weight of viable seed per hundred pounds of seed for all strains averaged 21.7 for August, 1944; that is, if all the strains were thrown together and planted, the seed should have produced 21.7 pounds of good seed for each hundred pounds harvested. Since these strains are planted, harvested, and threshed separately, their value was also determined separately. The seed harvested in 1945 were of better quality on the average than was the case the previous year. For August, 1945, the 12 strains under consideration produced 37.1 per cent viable seed by weight as compared to 21 per cent for 1944. The low strain, which was also low in 1944, produced seed 30 per cent of which were classed as viable. The best seed came from a strain with 45 per cent good seed. This strain was high for viable seed content in 1944 and contained 38 per cent viable seed by weight. Seed quality and yield of the strains on test have been as variable at other locations in the state at which the tests were conducted as at Baton Rouge. Certain of the strains appear adapted over a wider area than others. A complete report of the results of the tests conducted at different sections of the state will be published later.

About 250 pounds of seed of two strains were supplied to a number of farmers in the state in the spring of 1945 for seed increase purposes. The yield of seed was not up to expectations, but the majority of the cooperators secured stands and should have good seed yields this year on about 40 acres if 1946 is a favorable season for a seed crop. The method adapted for planting first year increase seed is to plant the seed

in drills of ordinary width as used for cotton at the rate of 5 pounds per acre. Drilling should be done on well-prepared land and on a level, not on beds. This method has proved to be very satisfactory at Baton Rouge. Ordinarily a complete cover of the land by Dallis grass is obtained the second season. Additional seed are being supplied to farmers for the same purpose under the same plan for 1946.

Seed harvests were also made on a progeny test in which 144 progenies were planted in 1944. The seed were harvested in June and August, but insufficient seed were produced in this test after August to harvest, as indicated by the yield of the smaller test. Frequent showers and hot sunshine prevailed at Baton Rouge throughout August and September. The average yield of the progeny test for June was 126 pounds per acre and for August, 141 pounds. Significant differences existed between individual strain and progeny yields in both harvests. The analysis of the seed for the larger harvest is incomplete at this time.—*C. R. Owen.*

Clover and Lespedeza Improvement

A breeding program for clover and lespedeza was begun in 1945. In this program emphasis will be given to the improvement of white clover, red clover and annual lespedeza. The purpose is to isolate varieties or strains of these crops that will be better suited to production under Louisiana conditions. Attention will also be given to methods of seed production. A large number of selections were made from native stands of these crops last season, and work is underway for planting and testing of the material in 1946.—*C. R. Owen.*

Effects of Depth of Application on the Loss of Nitrogen From Flooded Soil and on the Yield of Rice

The loss of appreciable quantities of nitrogen by diffusion and volatilization from flooded soil has been found to occur under both laboratory and greenhouse conditions. A study to determine whether placement of fertilizer at greater depth than that ordinarily used in the field would reduce nitrogen loss and thus increase the yield of rice in pot experiments was conducted in the open under a wire cage which prevented damage to the crop by rodents and birds. Crowley silty clay loam from the Louisiana rice area was placed in pots to a depth of seven inches. A complete fertilizer, 800 pounds per acre of an 8-8-8, and varying amounts of nitrogen alone were applied to the soil at depths of one inch and four inches. Rice was planted one inch deep in April and pots with duplicate treatments were left unplanted.

Relatively large quantities of ammonium nitrogen appeared in the flood water in three weeks where 800 pounds of 8-8-8 fertilizer were applied at one-inch depth and rice was not planted. Only small quantities

appeared in the water where the fertilizer was placed four inches deep or where rice was planted with the fertilizer placed one inch deep. In all cases the ammonium nitrogen practically disappeared from the flood water by time of harvest, including those cases where ammonium nitrogen was added to the flood water at the booting stage. The use of 800 pounds of 8-8-8 fertilizer doubled the yields. Placing the fertilizer at the four-inch depth resulted in slightly higher yields of rice than were obtained with the fertilizer at the one-inch depth. Supplemental applications of nitrogen to the flood water did not increase the yield of rice where 800 pounds of 4-8-8 fertilizer were applied at planting. Nitrogen alone applied to the flood water just before the booting stage increased yields by about 22 per cent over those obtained from the checks. In all cases where ammonium nitrogen was applied to the flood water a much darker green color was observed in the plants within three to five days after the application, and this darker color was retained until maturity of the grain. Nitrogen applied to the flood water invariably resulted in a higher protein content of the grain irrespective of its influence on yields. Losses of nitrogen by volatilization were apparently reduced by the presence of the crop and were replaced to some extent by nitrogen contained in the rain water. The reaction of the flood water increased from pH 6.4 to 6.7 during the growing period where rice was planted. Final reactions varying from pH 7.3 to 8.0 were observed where the crop was not planted. The field temperatures for the growing season of 1945 were below the average. This tended to minimize nitrogen losses.—*W. H. Willis and M. B. Sturgis.*

Sugar Cane Fertilizer Experiments

Sugar cane fertilizer experiments were conducted by the Louisiana Experiment Station on one plantation in each of the following parishes: Lafayette, Iberia, St. Martin, and St. Mary. Fifteen different fertilizer grades were used in each of these tests. The experiments were designed so that each grade or kind of fertilizer occurred at least three times in each experiment, with one fertilizer (40-20-40), and the no-fertilizer, or check, treatment being repeated six times each.

The fertilizer was applied uniformly to each side of the row in the furrow formed by off-barring the cane.

These experiments have not been conducted sufficiently long to justify definite or general fertilizer recommendations. The results obtained, however, indicate that nitrogen can be profitably used at somewhat higher rates than is normally used, and that at the higher rates of nitrogen, the cane will also respond to potash and phosphorus fertilizers.

—*Charles F. Simmons.*

The Soils Laboratory and its Service to the Farmer

During the past year the Soils Laboratory received 1870 soil samples which have been analyzed and recommendations made to the farmers and the various agencies assisting farmers in collecting the samples. A very large portion of these samples was sent in for recommendations for establishing improved pastures; others were for field crops and a few samples were received for fertilizer recommendations on truck crops and home gardens. In general, these soil samples were distributed over the state. Some samples were received from almost every parish. The areas where the sampling has been more concentrated are the north-western part of the state, the Lafayette area, and the vicinities of Monroe, Ruston, Rayville and Tallulah.

In addition to analyzing samples for farmers, outfield experiments, sugar cane experiments, and pasture experiments have been sampled and the soils analyzed for correlation with field results. Some samples were received for special determinations, such as soluble salt and arsenic contents. These were from the rice area. Not only have these analyses been made, but work has been done on improved methods for available potassium and magnesium determinations.

The soils of the flatwoods areas of the Coastal Plain and the Pleistocene terraces are more acid and have higher lime requirements than any other area of the state. These soils are usually very deficient in phosphorus and potassium.

The soils in the rolling and hilly areas of the Coastal Plain are usually acid, having lime requirements varying from 1,000 to 3,000 pounds of calcium carbonate per acre. There are a few areas, however, that need less lime, some being calcareous. Phosphorus and potassium are also needed in most of these soils.

The soils of the Mississippi River terraces and loessial hills are usually moderately acid and need to be limed. A few calcareous areas are found. The soils are, as a rule, very deficient in available phosphorus and potassium, but there are some areas that need no phosphorus and fewer areas that need no potassium.

About one-third of the soils analyzed in the Coastal Prairies do not need lime, but most of the others are moderately acid. Phosphorus is needed in practically all areas of the Coastal Prairies. Potassium is needed especially in the more sandy areas and in the soils low in organic matter.—*C. W. McMichael and R. H. Brupbacher.*

Results of Rotation-Fertility Test Indicate the Value of Better Fertilizer Usage and Crop Management

This test was designed to measure the effect of rotations, fertilizer treatments, and winter legumes upon the yields of cotton and corn and on the maintenance of permanent soil fertility. It has been conducted

TABLE 1. YIELDS AND CALCULATED VALUES OF RETURNS FROM FERTILIZERS

Plot No.	Crop and cropping sequence	Fertilizer treatment per acre	1939-1945 7-yr. av. yields of corn and seed cotton	7-year av. annual increases in yield from fertilizer		Cost of fertilizer* per acre	Value of av. increase per acre over cost of fertilizer		Fertilizer cost per unit of increase in yield
				Corn and seed cotton	Value of increase per acre		From corn or cotton	Av. of corn and cotton	
1	Corn and soybeans continuously	No fertilizer	22.5 bu.	continuous check	Dollars	Dollars	Dollars	Dollars	
2	Cotton continuously	No fertilizer	515 lbs.	continuous check					
3	Corn and soybeans continuously	300# 6-8-4 annually	36.8 bu.	14.3 bu.	12.64	5.00	7.64	11.50	35c per bu.
4	Cotton continuously	300# 6-8-4 annually	787 lbs.	272 lbs.	20.37	5.00	15.37		5.0c per lb. lint†
5	Corn and soybeans in rotation with . .	No fertilizer	20.2 bu.	rotation check					
6	Cotton	No fertilizer	591 lbs.	rotation check					
7	Corn and soybeans in rotation with	No fert. to corn	28.9 bu.	8.7 bu.	7.69	none	7.69	20.72	None
8	Cotton	600# 6-8-4 to cotton	1175 lbs.	584 lbs.	43.74	9.99	33.75		4.7c per lb. lint‡
9	Corn and soybeans in rotation with	36# N s.d. to corn	39.4 bu.	19.2 bu.	16.97	4.50	12.47	23.18	23.4c per bu.
10	Cotton	600# 6-8-4 to cotton	1177 lbs.	586 lbs.	43.89	9.99	33.90		4.7c per lb. lint‡
11	Corn and soybeans in rotation with	Winter leg. to corn	32.7 bu.	12.5 bu.	11.05	3.00†	8.05	19.29	24.0c per bu.
12	Cotton	600# 6-8-4 to cotton	1132 lbs.	541 lbs.	40.52	9.99	30.53		5.0c per lb. lint‡
13	Corn alone continuously	No fertilizer	21.4 bu.						

*Cost of fertilizer per acre calculated on the basis of \$33.30 per ton of 6-8-4.

†Estimated cost of seeding with common vetch or Austrian winter peas.

‡Calculated on the basis of a lint percentage of 36.7%. Value of seed not included.

TABLE 2. YIELDS AND CALCULATED VALUES OF RETURNS FROM ROTATIONS

Plot No.	Crop and cropping sequence	Fertilizer treatment per acre	1939-1945 7-year av. yields of corn and seed cotton	7-yr. av. annual increase or decrease from rotations		Cost of fertilizer used over treatment of checks	Value of increase or decrease in yield of crop per acre	Average annual value per acre from rotations
				Corn and seed cotton	Value of increase or decrease per acre*			
1	Corn and soybeans continuously.....	No fertilizer	22.5 bu.	Not fertilized check	Dollars	Dollars check	Dollars	Dollars
2	Cotton continuously.....	No fertilizer	515 lbs.	Not fertilized check	.....	check .....	.....	.....
3	Corn and soybeans continuously.....	300# 6-8-4 annually	36.8 bu.	Fertilized check	.....	check .....	.....	.....
4	Cotton continuously.....	300# 6-8-4 annually	787 lbs.	Fertilized check	.....	check .....	.....	.....
5 and 6	Corn and soybeans in rotation with Cotton.....	No fertilizer	20.2 bu. 591 lbs.	-2.3 bu. 76 lbs.	-2.03 5.69	..... .....	-2.03 5.32	} 1.83
7 and 8	Corn and soybeans in rotation with Cotton.....	No fert. to corn 600# 6-8-4 to cotton	28.9 bu. 1175 lbs.	-7.9 bu. 388 lbs.	-6.98 29.06	..... .....	-6.98 29.06	} 11.04
9 and 10	Corn and soybeans in rotation with Cotton.....	36# N s d. to corn 600# 6-8-4 to cotton	39.4 bu. 1177 lbs.	2.6 bu. 390 lbs.	2.30 29.21	4.50†	-2.20 29.21	} 13.50
11 and 12	Corn and soybeans in rotation with Cotton.....	Winter leg. to corn 600# 6-8-4 to cotton	32.7 bu. 1132 lbs.	-4.1 bu. 345 lbs.	-3.62 25.84	3.00‡	-6.62 25.84	} 9.61
13	Corn alone continuously.....	No fertilizer	21.4 bu.	.....	.....	.....	.....	.....

*The value of cotton and corn was calculated from the average prices during 1939-45 of 7.49 cents per pound of seed cotton (36.7% lint) and 88.4 cents per bushel of corn.

†Cost of 36 pounds of nitrogen per acre calculated on the basis of \$40 per ton of nitrate of soda.

‡Estimated cost of seeding with common vetch or Austrian winter peas.

for seven consecutive years on Olivier silt loam at Baton Rouge. Although the results obtained will depend upon the duration of the test, since the levels of soil fertility of the different plots can be expected to change to some extent as the test is continued, the results obtained to date provide some interesting information.

Returns from Fertilizers Increased by Better Crop Management and Fertilizer Usage

The seven-year average yields obtained from 1939-1945, inclusive, together with the estimated value of the returns from fertilizers are given in Table 1, page 46.

The data for the seven-year average yields show that application of 300 pounds per acre of a 6-8-4 fertilizer to corn and soybeans grown continuously gave an increase of 14.3 bushels of corn per acre. Similarly, a 300-pound-per-acre application of a 6-8-4 fertilizer to cotton grown continuously gave an average increase in yield of 272 pounds of seed cotton per acre.

When the cotton was grown in rotation with the corn and soybeans and all the mixed fertilizer, i.e., 600 pounds per acre, was applied to the cotton (Plots 7 and 8), the average annual increase in yields was 584 pounds per acre of cotton and 8.7 bushels of corn. The yields of other rotations in which (1) a side-dressing of 36 pounds per acre of nitrogen as nitrate of soda is applied to the corn and soybeans (Plots 9 and 10) and (2) winter legumes are turned under before the corn and soybeans (Plots 11 and 12) are also shown. These yields and the accompanying data on the value of the average increases in yield over the cost of fertilizer and on the fertilizer cost per unit of increase in yield show the comparable returns from the different crop and fertilizer practices.

Returns from Rotations Improved by Good Fertilizer Practices

The yields and data on the value of returns from the rotations are given in Table 2, page 47.

The data in Table 2 show that when fertilizers were not used the rotation of cotton with corn and soybeans as compared to continuous cropping gave an increase of only 76 pounds per acre of seed cotton and a decrease of 2.3 bushels per acre of corn. These changes in yields are due to the fact that in the rotation the cotton gets the first year's benefit from turning under the soybeans. The net average annual value derived from the rotation was only \$1.83 per acre.

When fertilizers were used, rotation proved to be of considerably more value. In the rotation where all the fertilizer, i.e., 600 pounds of a 6-8-4 per acre, was applied to the cotton (Plots 7 and 8), an average increase of 388 pounds per acre of seed cotton and a decrease of 7.9 bushels per

acre of corn were obtained. This rotation gave net annual returns of \$11.04 per acre. Where an additional 36 pounds of nitrogen per acre were applied as a side-dressing of nitrate of soda to corn (Plots 9 and 10), average increases in yield of 390 pounds per acre of seed cotton and 2.6 bushels per acre of corn were produced. The average annual value of these increases at the average prices is \$13.50 per acre. The use of winter legumes as a source of nitrogen for corn at Baton Rouge (Plots 11 and 12) has not proved to be as good as side-dressing. This is ascribed to the facts that (1) the winter legumes have not made an optimum growth of green matter at the time they are turned under before corn and (2) insect infestation and damage to the corn are nearly always higher following the turning under of winter legumes and this has frequently necessitated enough replanting of the corn in these plots to affect the yield some years.

Thus the data show that although a complete fertilizer was necessary for the best yields of corn on this soil, (1) the yields were not seriously reduced by growing corn in rotation with cotton where all the mixed fertilizer was applied to the cotton, and (2) the yields of corn in the fertilized rotation were increased by applying a side-dressing of supplemental nitrogen to the corn. It also appears that the best yields and returns of corn and cotton grown in rotation depend upon the proper and adequate use of fertilizers for the crops.—*Franklin L. Davis.*

Long-time Fertilizer Tests Give Information on Changes in Soil Fertility

Field experiments of long duration are useful for studying and measuring the small but eventual effects that long continued fertilizer and cropping practices have upon soil fertility. The results of field experiments of only a few years' duration provide information on the nutrient deficiencies of soils for the crops grown. However, the use of fertilizers or other soil amendments affects not only the immediate productivity of soils but also their eventual fertility level. As the result of the accumulation of some fertilizer constituents in the soil and the accelerated removal of other nutrient elements by the increased crop growth, or by leaching from rain, fertilizers have a residual effect upon soil fertility. Such residual effects may include (1) an increase or decrease in soil acidity, (2) a building-up of the phosphorus supply in the soil, (3) a decrease in organic matter content, (4) changes in tilth or physical condition of the soil, and (5) changes in the level of availability of all the known nutrient elements. Accompanying these changes are the effects that crop sequences and cultural practices exert upon the improvement or decline in soil fertility. Some information on the extent to which such changes occur in the fertility of an Olivier silt loam soil is furnished by the data and results given in Table 1, page 50.

TABLE 1. RESULTS OF COTTON FERTILIZER RATIO TEST ON OLIVIER SILT LOAM, PERKINS ROAD FARM, BATON ROUGE, LOUISIANA

Plot No.*	Pounds of plant food applied per acre† N-P ₂ O ₅ -K ₂ O	Yield in pounds of seed cotton per acre									Average increase aver. checks
		1938	1939	1940	1941	1942	1943	1944‡	1945	8-yr.av.	
1	30- 0-24	917	476	269	424	250	38	249	48	334	— 5
2	30-24-24	1501	938	738	1146	1078	636	1226	828	1011	672
3	30-36-24	1538	1045	828	1224	1054	916	1415	960	1123	784
4	30-48-24	1622	1224	910	1209	1018	1044	1460	1070	1195	856
5	30-60-24	1704	1238	994	1274	964	1109	1613	1063	1245	906
6	0- 0- 0	903	443	203	330	250	105	323	110	333	check
7	0-48-24	1374	851	583	706	326	688	929	470	741	402
8	18-48-24	1411	945	735	930	635	871	1179	798	938	599
9	24-48-24	1444	983	741	954	629	949	1410	958	1009	670
10	30-48-24	1521	1000	806	920	686	895	1373	936	1018	679
11	36-48-24	1666	1193	881	1085	975	1001	1521	1038	1170	831
12	42-48-24	1717	1129	1016	1150	1119	1014	1416	1025	1200	861
13	0- 0- 0	917	474	209	335	340	76	340	70	345	check
14	30-48- 0	1471	765	820	1020	908	334	938	476	842	503
15	30-48-12	1571	978	855	1178	1175	761	1088	785	1049	710
16	30-48-24	1657	1048	868	1174	996	988	1363	988	1135	796
17	30-48-36	1678	1125	880	1176	998	1043	1485	1054	1180	841
18	30-48-48	1716	1148	1009	1235	856	1071	1433	993	1183	844

*Four series or replications of plots.

†Nitrate of soda, superphosphate and muriate of potash were used as the sources of nitrogen, phosphoric acid and potash, respectively.

‡Austrian winter peas were planted on all plots in the fall of 1943 and turned under in the spring of 1944

The data on growth of green matter and nitrogen content were given in the Annual Preliminary Report of the Department of Crops and Soils for 1944.

The soil on which this test is located is part of an old field that had not been cultivated for a number of years prior to 1938 and had been allowed to grow up with broom sedge and lespedeza. It is old, cultivated land whose native fertility had been largely exhausted and is considered as being representative of much of the Olivier silt loam that constitutes a large percentage of the terrace soils of East Baton Rouge Parish.

The results show that 48 pounds of phosphoric acid per acre produced close to the maximum yields and that 36 to 42 pounds of nitrogen per acre can be used. Twelve to 24 pounds of potash per acre were sufficient to produce good yields of seed cotton most years, but the cotton on the plots receiving only 12 pounds per acre was difficult to pick and appeared to be of poor quality. The prevalence of leaf spot and mild rust-like condition of the cotton during the 1944 and 1945 seasons indi-

cate that a potash deficiency is developing on the plots receiving 48 pounds per acre of P_2O_5 and only 24 pounds per acre of K_2O .

The yields on Plot No. 1 show that supplying phosphorus is essential in increasing the yield of cotton on this soil. Even when 30 pounds of N and 24 pounds of K_2O per acre were supplied, the yields were no larger than those of the unfertilized check plots (Nos. 6 and 13).

The yields obtained in 1942 show that excessive rains during the growing season seriously affected the utilization of the fertilizers applied. Although the plants made a rank growth and boll weevils did but little damage, the plants fruited poorly. The soil was kept soggy and the plants shed many small bolls. As a result, the yields from the different levels of nitrogen differed more than in any other year. Furthermore, both the 24-pound-per-acre application of P_2O_5 (Plot No. 2) and the 12-pound application of K_2O (Plot No. 14) produced yields as large as or larger than those obtained from the heavier applications.

The data also show the rapid decline in yields that results from continued cropping without the use of fertilizers or soil-building crops (Plots Nos. 6 and 13). With the exception of the year 1942, the differences between the yields obtained from the successively larger applications of all three nutrients—N, P_2O_5 and K_2O —tended to increase each year. In other words, the yield on the poorly fertilized plots, whether the inadequately supplied nutrient was nitrogen, phosphorus, or potassium, decreased more rapidly than did the yields on the better fertilized plots where all three nutrient elements were supplied in adequate amounts.

The yields obtained in 1944 following the winter legumes indicate that the gradual decline in yields might be due to a depletion of soil organic matter. This was partially substantiated by the fact that, while larger yields were obtained following the use of the green leguminous manure, the actual yields obtained on Plots Nos. 7 to 12 were much more closely correlated to the amounts of nitrogen supplied in the fertilizer than they were to either the amount of green matter turned under or to its content of nitrogen.—*Franklin L. Davis.*

Out-Field Work

Oat Fertilization Experiments

In experiments conducted on Miller very fine sandy loam soil in Red River Parish and on Yahola very fine sandy loam soil in Caddo Parish the highest yields were obtained by applying 300 pounds of 5-8-8 under oats before planting in the fall and top-dressing with 45 pounds of nitrogen about March 1. In an experiment on Portland very fine sandy loam soil in Ouachita Parish, the application of 60 pounds of nitrogen as a top-dressing on March 2 gave the highest yield. Other experiments were conducted in Franklin Parish on Olivier silt loam soil and in Red River Parish on Cahaba fine sandy loam soil.

Corn Fertilization Experiments

On a Lintonia silt loam soil in St. Landry Parish the use of 300 pounds of 5-8-8 under corn before planting and a side-dressing with 45 pounds of nitrogen gave the highest yield in an experiment where there was a heavy growth of interplanted soybeans. Somewhat similar results were obtained on an Olivier silt loam soil in St. Landry Parish, but the yield of corn was limited by very wide spacing and a very heavy growth of interplanted soybeans. Other experiments were conducted in St. Helena, Caddo, Claiborne, Morehouse and Red River Parishes.

Corn Variety and Hybrid Corn Experiments

In an experiment in St. Helena Parish the best Louisiana hybrid, No. 520, outyielded the best open-pollinated varieties, White Tuxpan and Cocke's Prolific, by 40 per cent. In Claiborne Parish the best Louisiana hybrids were Nos. 1030 and 476, which gave 20 per cent higher yields than Cocke's Prolific, the highest yielding open-pollinated variety. In both experiments the Louisiana hybrids outyielded other hybrids which were included.

Cotton Fertilizer Experiments

In Morehouse Parish on a Portland very fine sandy loam soil, 500 pounds of 8-8-8 fertilizer produced the highest yield, which was 1,000 pounds per acre more than was produced without fertilizer. In Claiborne Parish on a Ruston sandy loam soil, 500 pounds of 8-12-8 gave the largest yield. In this experiment there was but little increase from the use of nitrogen and potash where no phosphate was used. On Lintonia silt loam soil in St. Landry Parish 500 pounds of 8-8-12 produced the highest yield. Other experiments were conducted in St. Helena, Caddo and East Carroll Parishes.—*F. A. Peevy and W. J. Peevy.*

*Dairy Research*¹

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Mt. Hermon Pasture Yields 6,000 Pounds Milk Per Acre

Cows grazing on the B. P. Alford experimental pasture near Mt. Hermon produced in 1945 milk equivalent to 6,000 pounds for each acre grazed. This milk was valued at \$210. Deducting from this \$72, the cost of the grain supplement fed, left an average of \$138 per acre over and above feed cost. The fertilizer bill based on an application every second year averaged \$8 per acre yearly. When this also is deducted from the value of the milk there remains \$130 as return for labor, interest on investment, profit, etc.

Samples of herbage clipped from protected areas within the Alford pasture showed yields that averaged 4.06 tons of air-dry hay per acre. Areas of the pasture that had been rebroken and reseeded in the fall of 1943 averaged 5.18 tons, while that not broken, but otherwise treated the same, averaged 3.52 tons per acre. Likewise, the area that had been renovated produced herbage that analyzed 10.7 per cent protein as compared to 9.2 per cent for that not renovated, and the calcium showed a similar trend, 0.80 per cent, as compared to 0.76 per cent. More clover was in evidence on the renovated areas than on those not renovated, which probably explains the higher yield and the higher content of protein and calcium.—*D. M. Seath and L. L. Rusoff.*

Mineral Deficiencies of Louisiana Dairy Herds

One phase of the controlled mineral feeding experiment with dairy heifers and cows has been terminated. This involved the supplementation of the basal ration of native grass hay, cottonseed meal or blood meal, corn and salt with calcium (oyster shell flour), phosphorus (disodium phosphate) and both calcium and phosphorus (steamed bone meal).

The various groups of animals on experiment were not allowed any pasture, native grass hay being their only source of roughage. Thus, the animals were subject to rigorous conditions. The physical condition of all the cows, whether receiving mineral supplementation or not, was poor to mediocre, except for a month or two before calving.

Mineral supplementation of calcium or phosphorus or both these minerals to the basal ration did not appear to be the only limiting fac-

¹ See page 117 for report on Dairy Research at the North Louisiana Experiment Station.

tor involved when growth, body weights, and milk and fat production were taken into account. Also, blood calcium and inorganic phosphorus analyses, reproduction data, and general condition of the animals showed no significant differences between the groups of cows.

—*L. L. Rusoff and D. M. Seath.*

Dairy Cattle Inherit Tolerance to Heat

Studies on the reaction of Jersey and Holstein cows to warm weather during 1944 and 1945 gave convincing evidence that the ability of dairy cows to tolerate heat is hereditary. First, it was found that Jerseys, as a breed, did not show as large an increase in body temperature due to hot weather as did Holsteins. Second, and more significant, it was found that the daughters of certain sires of each breed were more tolerant to heat than were those by other sires. This trend was present for both of the two years studied, for the rank of the seven sires based on the heat tolerance of their daughters was, with one exception, the same for 1945 as for 1944.

Results from this study would give encouragement to a dairyman attempting to increase the heat-tolerance ability of his dairy cattle by breeding and selection within a given dairy breed without bringing in outside blood such as that from the Brahman.

—*D. M. Seath and G. D. Miller.*

Night Grazing Greatly Increased in Hot Weather

Constant observation of three Jersey and three Holstein milking cows during one week in the summer of 1945 showed that the cows averaged less than two hours grazing during daytime periods on warm days; but they endeavored to make up for this by extended grazing periods at night. During two relatively warm days the grazing periods between morning milking and evening milking were 1.9 hours for one day and 1.8 hours for the other. The remainder of this daytime period was spent in the shade. Night grazing for these days averaged 5.7 hours and 5.5 hours, respectively, or more than three times the length of time grazed in the daytime.

Grazing time on two relatively cool days was 2.4 times as much in the daytime as during the relatively warm days; and on the cool days the grazing time for the 24 hours averaged more than one hour longer than for the warm days.

Cows averaged for all days studied 1.4 grazing periods during the daytime and 2.7 periods during the night. Three grazing periods were the most common at night, and the time spent grazing averaged 5.5 hours, while 3.5 hours were spent lying down and 0.7 hours were spent standing without grazing.

Results of the study suggest the need for good pasture at night and, especially on warm days, for an excellent daytime pasture which will permit cows to become filled prior to the time that they seek comfort in the shade. Likewise, the results show a need for testing the value of furnishing supplemental feed such as hay to cows during their long periods in the shade.—*D. M. Seath and G. D. Miller.*

How High Humidity and High Temperature Affect Dairy Cows

High relative humidity appears to be of minor importance when compared to high atmospheric temperature as a factor contributing toward the discomfort of cows in summer months. This was the conclusion drawn from a study made of Jersey and Holstein cows at Louisiana State University during the summers of 1944 and 1945.

For each of the two years the correlation between humidity and respiration showed that as relative humidity increased, the respirations dropped a very little. The correlations were therefore negative, $-.06$ and $-.02$. These relationships are too small to have much significance, for a perfect correlation is either $+1.0$ or -1.0 . All relationships were measured after removing effects due to herd, breed, and changes in air temperature. Correlations between humidity and body temperature of cows were positive each year, $+.16$ and $+.10$, thus showing that a very small average increase in body temperature took place in step with increases in humidity. However, humidity and pulse (heart rate) showed small negative relationships one year and small positive ones the other year, indicating no definite trend.

Increases in air temperatures caused significant increases in body temperatures of cows, in pulse rates and in their respiration rates. Correlations measuring the air temperature and body temperature relationships were $+.67$ for 1944 and $+.53$ for 1945. For air temperature and pulse it was $+.20$ and $+.16$. It was higher for air temperature and respiration, $+.75$ and $+.35$.

The size of these correlation coefficients indicates quite definitely that it is high atmospheric temperature and not high humidity that is largely responsible for the discomfort of cows in summer months.

—*D. M. Seath and G. D. Miller.*

Manure and Commercial Fertilizer Produced Good Pasture at DeRidder

Application of barnyard manure caused increases in growth of seeded pasture averaging 84 per cent in 1944 and 83 per cent in 1945. These were the results from the pasture test on the Fred Tenney Dairy Farm, DeRidder, Louisiana, which consisted largely of white Dutch clover

seeded in October of 1943. The increases in yield due to manure were shown in comparisons of clippings made during late April of each year. Highest average yields were secured from areas treated with lime, potash, and phosphate in combination with manure.

Plots receiving no fertilizer had the lowest yields, 0.66 tons of air-dry hay per acre in 1944 and 0.46 tons in 1945. Manure increased these yields to 1.28 and 1.51 tons for the respective years. During 1944 the highest average yield, 2.33 tons, was secured from the plots receiving manure, lime, phosphate, and potash. In 1945 the plots treated with manure plus phosphate were highest, with 1.41 tons per acre. Only one fertilization of the plots was made and that took place in the fall of 1943 when the comparative applications were made, using 5 to 7 tons of manure, 1 ton of lime, 300 pounds of 20 per cent phosphate and 100 pounds of 48 per cent muriate of potash per acre. Yields of clover during the second season (1945) averaged approximately one-third less than that for the first season (1944).

Analyses of clippings taken from the experimental pastures showed marked increases in the protein and mineral percentages due to fertilization. Highest values were shown for areas treated with manure, lime, phosphorus, and potash. As an example, the analyses in 1945 showed that treatment with manure had increased the protein content by 13 per cent, the calcium by 7 per cent, and the phosphorus by 22 per cent over that shown by areas otherwise treated the same.

Among plots not receiving manure best results were secured when the full commercial fertilizer treatment was used, namely, lime, phosphate, and potash. Differences in results due to variations in the original seed-bed preparation were also found. The thoroughly prepared seedbed, including plowing, disking, harrowing, and packing, proved best. Next best was the use of disk rather than the plow in breaking the sod.

—D. M. Seath, L. L. Rusoff, and A. D. Fitzgerald.²

High Quality and Early-cut Hay Best Feed For Dairy Cattle

Four digestion trials have been completed which show that high quality hay, especially that which is cut early, has high percentages of protein and total digestible nutrients.

The digestion trials, in which four dairy steers were used, determined the feeding value of late-cut native grass hay, common or Japanese lespedeza hay (*Lespedeza striata*) cut in the bloom and early-seed stages, and Alyce clover hay.

The native grass hay contained about 90 per cent carpet grass, with the remainder mostly sedge grass, and was obtained from Tangipahoa

² County agricultural agent at DeRidder.

Parish, as was the Alyce clover hay, 95 per cent pure. The two lots of common lespedeza hay were obtained from the George Gayden farm in East Feliciana Parish. This hay contained approximately 20 per cent foreign material, including grass, weeds, and oat stubble. The composition of crude (total) protein was lowest for the native grass hay, 6.61 per cent, and highest for the Alyce clover hay, 12.26 per cent. Crude protein content of the common lespedeza hay was in between the above range, 10.52 per cent for the bloom stage and 8.55 per cent for the early-seed stage.

The digestible protein as determined by the trials was also lowest for the native grass hay, 2.14 per cent; the common lespedeza hay had 5.01 per cent for the bloom stage and 3.33 per cent for the early-seed stage; and the Alyce clover hay had the highest digestible protein, 7.52 per cent.

The total digestible nutrients were in the same order as that for the percentage of digestible protein, namely, native grass hay 40.03, common lespedeza hay at bloom stage 50.06, common lespedeza hay at early-seed stage 48.28, and Alyce clover hay 55.58.

—*L. L. Rusoff, D. M. Seath and G. D. Miller.*

Complete Fertilization Produced Best Pasture at Bogalusa

Barnyard manure and potash fertilizer, or both, when used in combination with lime and phosphorus, caused marked increases in pasture growth and nutritive value as compared to pasture herbage from areas treated with only lime and phosphate. These results were secured in 1945 from the dairy pasture experiment on the H. N. McEwen farm near Bogalusa, Louisiana, and are similar to those secured in 1944.

The lime and phosphate treatment resulted in yields averaging 3.66 tons of air-dry hay per acre, while this basic treatment when combined with barnyard manure or potash, or both, resulted in yields averaging from 5.12 to 5.55 tons per acre. The protein and mineral content of the pasture herbage also showed increases wherever the more complete fertilization took place. The protein produced on one acre of these most productive pasture areas averaged 1,140 pounds, or an amount equivalent to that in 28 sacks of cottonseed meal. This resulted from a yield of more than five tons of hay per acre with an average protein content of slightly over 11 per cent. This protein yield was almost double that from areas treated with only lime and phosphate. In like manner, the calcium yield per acre increased from 44 to 82 pounds and the phosphorus from 25 to 48 pounds per acre.

Increases in the yields of the various nutrients can be explained by the better stands of clover and Dallis grass found on the areas receiving the more complete fertilizer treatment.—*D. M. Seath and L. L. Rusoff.*

Entomology

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DDT-Nicotine Combination Effective Against Cabbage Worms

The problem of controlling worms on cabbage and related crops is complicated by the fact that a very small amount of harmful residue is allowed to remain on the harvested product. This implies that insecticides used to combat these pests must be non-poisonous to man, or used only on the early stages of growth before edible portions of the plants are developed. In the latter case the insecticide would have to be strongly adhesive and long lasting in effect so as to give continued protection to the plants during the final and critical period of growth and maturity. With these requirements in mind, a series of experiments was conducted during 1945, the purpose of which was to develop an insecticide or a combination of insecticides for cabbage worm control.

A DDT-nicotine dust mixture gave an almost perfect control of these caterpillars. Infestation counts showed that the DDT-nicotine treated plants contained but slightly more than 1 per cent as many worms as did the plants on the check plots. The rotenone-nicotine gave a fairly satisfactory control though considerably inferior to the DDT-nicotine. While it gave a slight reduction in the worm population, nicotine alone was unsatisfactory.—*C. E. Smith, T. C. Barber and T. P. Dutsch.*

The Sand Wireworm Can Be Controlled with Crop Rotation and Sound Cultural Practices

Sand wireworm studies at Ringgold, Bienville Parish, were continued during 1945, with two lines of investigation being followed. One was looking into the possibility of control by the use of chemicals, and the second and most practical line consisted of cultural practices, including crop rotations, cover crops, fertilizations and the growing of improved varieties of crops.

In the early studies it was found that a number of legumes and cereals could be grown successfully on these wireworm infested soils; also, that the plowing under of winter cover crops improved not only the stands but also the quality and quantity of summer crops. Consequently, in 1944, a long-range rotation program was initiated. The rotation includes tests of nearly every economically important crop adapted to the section; both hay and cover crops for the winter months, and summer crops for feed and cash purposes. Each crop follows another in a rotation which widely separates those crops most susceptible to wireworm attack.

During the spring of 1945, heavy crops of oats and vetch combined, oats alone, Singletary peas, Austrian winter peas, and crimson clover were harvested from their respective plantings. A total of 36 large 2-horse wagon loads of hay were harvested from slightly less than eight acres.

During the summer of 1945, good crops of peanuts, sweet potatoes and corn were harvested. A total of 45 bushels of corn (La. 468) was harvested from slightly over one acre, a heavy yield for the locality. Two good hay cuttings were made from the planting of Sudan grass, and two fair cuttings from the area planted permanently to *Lespedeza sericea*. Soybeans gave indifferent results, since they were very patchy and uneven in growth, apparently because of lack of seed inoculation. *Crotalaria spectabilis* germinated rather poorly, but developed into large uniformly blooming plants.

As a result of the soil improvement program maintained over the past several years, the experimental field has shown a substantial recovery from the depleted condition of a few years ago. The crops harvested during 1944 and 1945 greatly exceed, both in variety and quantity, the average of crops grown in the surrounding vicinity. Also, the wireworm population of the field has been greatly reduced, it now being quite difficult to find specimens in the previously most heavily infested portions of the field.

Chemical Control of the Sand Wireworm Ineffective

Attempts to evolve a practical control of the sand wireworm by use of soil fumigants and other chemicals have been unsuccessful to the present time. The studies during 1945 consisted of tests with different concentrations of DDT dust, DD emulsion, ethylene dichloride emulsion and several proprietary preparations. None gave promising results.

—T. C. Barber and C. E. Smith.

Velvetbean Caterpillar on Soybeans Can Be Controlled with DDT or Cryolite

During 1945 studies on the control of the velvetbean caterpillar by the use of insecticides were continued. They consisted of small plot tests in which the relative effectiveness of several different insecticidal mixtures and different times of application were compared; and also some practical field dusting with powered ground dusters and airplanes.

The results showed that DDT is slightly better than cryolite in controlling this insect, especially being longer lasting in effect. This was demonstrated in the different date of application tests in which the insecticides were applied August 28, September 3 and 10. The cryolite treatments yielded 1.6, 1.43 and 1.49 bushels more soybean seed than did the check, whereas the DDT (3 per cent) yielded 6.05, 4.26 and 3.05 bushels more than the check. These results also showed that the earlier

the applications, the better were the results, especially in the DDT treatments.

The results of the practical field dusting showed that one application of either cryolite or DDT properly timed will control this caterpillar adequately; and about September 1 is the best time to make the applications in the seed producing area of Louisiana. Therefore, it appears at this time that the most practical treatment for the control of the velvetbean caterpillar is: Make an early application of DDT or cryolite just as soon as the infestation is sufficient to justify dusting, and a second application later, if and when there is sufficient reinfestation.

—A. L. Dugas and C. E. Smith.

It Paid to Dust Cotton for Boll Weevil Control in 1945

The control of the boll weevil is an essential farming practice, as was demonstrated over practically the entire state in 1945. Weather conditions, especially the frequent and excessive rainfall that occurred during July and August, were favorable to the boll weevil, making poisoning necessary. Although considerable poisoning was done, a large percentage of the cotton crop was not protected against the ravages of these insects. This was due to several factors, including shortages of dusting machinery and nicotine (many growers will not apply calcium arsenate without nicotine for the control or prevention of aphid build-up), frequent rains, etc.

As demonstrated in numerous instances observed, it is under unfavorable conditions such as those prevailing in 1945, that it is most profitable to apply insecticides for the control of cotton insects. One striking example was observed in Rapides Parish where one grower made 10 applications of calcium arsenate (two of which contained nicotine for aphid control) on his cotton, whereas a neighbor just across a turn row and ditch made one application and quit on account of the rains. The yields of the former averaged over 625 pounds of high-grade lint-cotton per acre, and the latter made about 500 pounds or less of seed cotton of low quality. Many other similar or parallel cases were observed. Total to near crop failures where no poisoning was done were numerous.

Nicotine in Dry Concentrate Powder Form Is Effective in Preventing Build-up of the Cotton Aphid

Studies designed to find a more satisfactory insecticide or insecticidal mixture to replace the old standard, and somewhat objectionable, calcium arsenate-nicotine (liquid sulphate) mixture for boll weevil and aphid control were continued during 1945. These studies were centered largely on a new non-volatile dry concentrate powder form of nicotine and, to a less extent, on other chemicals, especially new forms of arsenicals that were thought might control the boll weevil and not induce aphid build-up.

The results of these tests showed that in all cases where the cotton aphid infestation was sufficiently heavy to materially affect the yield, the dry concentrate treatments consistently out-yielded the liquid sulphate treatments. This applied also in the tests of different concentrations of the two forms of nicotine, being more pronounced in favor of the dry concentrate in the weaker concentrations. In one experiment, the average yield of seed cotton for all of the dry concentrate treatments was 2,339 pounds per acre compared to 2,199 pounds of seed cotton per acre for the liquid sulphate treatments.

The results of the experiment testing different arsenical preparations showed that the aphid build-up closely paralleled the toxicity of the materials to the boll weevil. In other words, the more toxic a material was to the boll weevil, the greater was the aphid build-up.

—*T. P. Dutsch, T. C. Barber, J. L. Crigler and C. B. Haddon.*

Sugar Cane Borer Control

The efficacy of cryolite dusting for borer control has been proved, and the practice is fairly well established as a practical control. In 1945, investigations were continued with the view of finding means of increasing the effectiveness of cryolite, and perhaps, finding a cheaper material equal to or better than cryolite.

The question of where the borers are killed by the poison seemed significant. Therefore, a test was conducted to study the mortality of various instar larvae at different locations on the plant—on the leaves, in the bud, and in the leaf sheaths. The results showed that an insignificant number of larvae were killed on the leaves. In comparison, a large number were found dead in the bud of the plant, and a rather small number in the leaf sheaths. These findings dispute the argument for a highly dustible material to assure complete coverage of the leaves, as might be desired in the control of some other pest. A somewhat heavier dust more likely to find its way down into the bud and leaf sheath would seem more desirable. Highly conditioned cryolite dusts were found to be less effective than the regular material.

Five and 10 per cent DDT dusts were compared with cryolite in several borer tests. DDT accounted for increases in borer infestation in all cases, probably because of its toxic effect on *Trichogramma* and the predators of the borer. In the study mentioned above, about 25 per cent more borers were found present in the DDT plots than in the cryolite or check plots.

Large Scale Field Application of Cryolite Dusting for Borer Control Studied for Three Years

An extensive study of the field application of cryolite dusting to control borers on numerous plantations, over a three-year period, has yielded some significant results. These may be summarized as follows:

1. The logical application of this dusting should embrace the whole community.
2. All of the infested cane on each plantation and in the community should be dusted for first generation control. Smaller areas showing up later should be cleaned up with second-generation dusting.
3. Dusting of all of the infested area prevents reinfestation and results in a more successful harvesttime control.
4. There was considerable decrease in the amount of dusting necessary on a given plantation from year to year. One heavily infested plantation required no dusting after two years.
5. Summer planted cane increases the amount of dusting required and intensifies the borer problem.
6. Successful field application required extensive field observation to determine the proper time to start dusting and the areas sufficiently infested to justify dusting.
7. Finally, cryolite dusting is a good, practical control for the borer and should be adopted along with other control recommendations.

Sodium Fluosilicate Proves More Toxic Than Cryolite to the Borer

In view of the promising results obtained with 50 per cent sodium fluosilicate in the fall of 1944, numerous tests were conducted in 1945 to compare the toxicity of cryolite and sodium fluosilicate against first and second generation borers and borers in summer plant cane; to study the relative effectiveness of various concentrations of sodium fluosilicate; and to evaluate the different brands of sodium fluosilicates for borer control.

Of 20, 30, 40, 50, and 75 per cent sodium fluosilicate dusts, the 50 per cent was found to be the desired strength, based on effectiveness, dustability and cost. The 50 per cent sodium fluosilicate dust proved to be definitely more effective than undiluted cryolite against first generation borers and borers in summer plant cane. Cryolite excelled the sodium fluosilicate in handgun tests for second generation control, but the two were equally effective in one plane test.

Different brands of sodium fluosilicate varied in effectiveness. Micro-nized or finely ground sodium fluosilicates were not nearly as effective as the more granular, large particle size dusts.

The build-up of the yellow sugar cane aphid following sodium fluosilicate applications was as heavy as or heavier than that following cryolite, although the general aphid infestation was considerably lighter than in 1944. Sodium fluosilicate injury to cane leaves was negligible in all first generation dusting, but appeared to be of some significance following second generation applications.

Cryolite Remains the Recommended Insecticide for Cane Dusting in 1946

Although the results obtained with sodium fluosilicate have been quite favorable, cryolite dusting is again recommended for borer control during the 1946 season. Further data are necessary before sodium fluosilicate can be recommended on an equal basis with cryolite.

—*A. L. Dugas, C. E. Smith and E. J. Conciennne.*

Turnip Aphid is Controlled with Nicotine and Nicotine-Rotenone Dust Mixtures

The results of tests conducted during the winter and spring months showed that the turnip aphid, an important and destructive pest of turnips, mustard, radish and related crops, is effectively controlled with dust mixtures of nicotine, and nicotine-rotenone. A DDT-nicotine dust mixture, while quite effective, gave a less aphid population reduction than either of the above two dust mixtures. However, the DDT-nicotine was superior in controlling the leaf-eating species, vegetable weevil, flea-beetles, caterpillars, etc., than any of the other dusts or dust combinations under test. The form of nicotine used was a non-volatile soluble dry concentrate powder.—*T. C. Barber and T. P. Dutsch.*

Onion Thrips Control

A series of experiments was conducted during 1945 in the continuation of attempts to discover an effective control for this destructive pest. Insecticides tested included nicotine alone in a non-volatile form (dry concentrate) and in combination with rotenone, with DDT, and with tartar emetic; and a sweetened solution of tartar emetic. The greatest reduction in the thrips population was effected by the DDT-nicotine combination. However, on harvesting the onions from the treated and untreated plots, little increase in yield resulted from the various treatments. The plots treated with nicotine-lime and with DDT-nicotine combinations gave the highest yields, but the increase was of only slight significance. Further experimentation is required on this problem.

—*C. E. Smith and T. P. Dutsch.*

Control of the Tomato Fruitworm and the Early Blight Disease

Experiments in cooperation with the Plant Pathology Department were continued in 1945 to find a safer and better control for the tomato fruitworm and early blight disease of tomatoes than the commonly used lead arsenate-Bordeaux mixture. While this mixture gives fair fruitworm control, it is somewhat objectionable because of the double-residue

hazard, both the lead and the arsenic being poisonous to human beings; and also the Bordeaux tends to retard the development and maturity of the tomatoes. Experiments during 1944 indicated that DDT-copper and cryolite-copper mixtures gave very satisfactory fruitworm control. However, evidence was obtained that the copper used in the different mixtures gave only moderate control of the early blight. A number of tests were repeated in 1945 using both copper and Dithane D-14 as fungicidal agents, in an effort to improve the disease control factor of the complex.

To cover seasonal variations, experiments were included on both spring and fall tomato crops, and the majority of the insecticide-fungicide combinations used were tested under both conditions. The experiments embraced a wide variety of insecticide combinations, including: cryolite alone, and also in combination with copper, with Dithane D-14, and with fused bentonite and sulphur, and as a bait with corn meal; DDT alone, and also in combination with copper and with Dithane D-14; calcium arsenate in combination with copper and with Dithane D-14; and Bordeaux-lead arsenate mixture.

The results obtained in the experiment with spring tomatoes were very inconclusive, mainly because of an extremely light insect infestation. The fall experiment, with a heavier insect infestation, gave more conclusive results. The DDT-copper combination gave the best yields and also the largest sized tomatoes, with the calcium-arsenate-copper combination not far behind. No outstanding results were secured, however, and the Dithane D-14 gave even less indication of controlling the early blight disease than did the copper.

—*T. P. Dutsch, T. C. Barber, L. H. Person and F. J. LeBeau.*

Results of Tests with DDT Against Several Miscellaneous Insects

In addition to the projected experiments during 1945, DDT was used in tests against several miscellaneous insects when infestations of sufficient numbers came to attention. Brief results of the more important tests follow.

American Cockroach

Two applications of a 10 per cent DDT dust practically eradicated a heavy infestation of this cockroach in an unoccupied poultry brooder house. The first application was made July 31, and the second on September 6; 4 days following the first application about two bushels of dead roaches were swept from the floor. The number killed by the second application was equally great, but consisted mostly of newly hatched nymphs. The building was practically free of living roaches by Sep-

tember 20 and remained so for two months, when the observations were discontinued.

Between the first and second applications, a total of 21 dead or dying mice were removed from the building, and four more on the day following the second application. Also a considerable number of earwigs, spiders and grain and carrion beetles were dead or dying scattered over the floor following the application.

German Cockroach

A cattle feeding barn, which was heavily infested with cockroaches, mostly of the German species, was dusted with a 10 per cent DDT dust on September 20. Observations showed that large numbers of dead and dying roaches were on the floor 22 hours after the applications, and others died over a period of 38 days. Also many earwigs, silverfish, spiders and carrion beetles were killed by the treatment.

In a cage test, in which the German Cockroach was the test insect, a 10 per cent DDT dust killed 100 percent of the insects within three days, and a 5 per cent dust killed 98 per cent within six days.

Fleas

Two infestations, a yard and garage, and a garage, were treated with 10 per cent DDT dusts. In both instances, the fleas had been biting children who played on the premises. No live fleas could be found on either place one day after the application. The premises were still free of the insects 20 days after the dustings.

Brown Dog Tick

Three infestations of the brown dog tick were treated with 10 per cent DDT dust. The results in all three were negative or practically so.

Flies

DDT in water suspensions, emulsions and oil solutions were tested against the several species of flies which infest cattle, dairy barns, dwelling houses, and like places. All forms were very effective, especially against the housefly, the hornfly, and the stable fly. These treatments on dairy cattle did not prevent horseflies and deer flies from feeding on the animals, but whether they obtained a lethal contact while feeding was not determined.—*T. P. Dutsch and C. E. Smith.*

Fertilizer and Feedstuffs Laboratory



Activities of the Laboratory

During the past year the major portion of the work done in the Laboratory involved the analysis of samples of feedstuffs, fertilizers and insecticides sold in the state. These samples were collected and sent to the Laboratory by the State Department of Agriculture. All analyses were reported to the State Department of Agriculture and mailed out from that department.

Under the laws regulating the sale of commercial feeds the manufacturer must guarantee the minimum percentages of protein and of fat and the maximum percentage of fiber. The Laboratory made the following determinations on samples of feedstuffs: water; mineral matter or ash; crude protein; fiber; fat and nitrogen-free-extract. More than 1,000 samples consisting of pure ingredients and mixed feeds of all types were analyzed. Wheat bran, wheat gray shorts, corn meal, corn chops, hominy feed, alfalfa stem meal, alfalfa leaf meal, rice bran, rice by-product, rice polish, dried brewers grains, whole pressed cottonseed, cottonseed meal, soybean meal and meat meal were analyzed. Mixed feeds analyzed included various types of dairy feeds, chicken mash, hog rations, horse and mule feeds, etc.

All fertilizers sold in the state must bear tags guaranteeing the percentages of nitrogen, phosphoric acid and potash. Nitrogen, total phosphoric acid, insoluble phosphoric acid, available phosphoric acid and potash determinations were made on more than 1,000 samples of fertilizers. The various types analyzed included nitrate of soda, cyanimid, ammonium nitrate, muriate of potash, superphosphate, colloidal phosphate, basic slag and different grades of mixed fertilizers.

All types of insecticides were analyzed, particular attention being given to calcium arsenate, Paris green, and lead arsenate.

More than 700 miscellaneous samples were sent or brought to the Laboratory for analysis by individuals and business concerns. Farmers often send in samples of fertilizers from which the manufacturer's tag has been accidentally removed. They also send in samples of feedstuffs or plant parts which may have potential feeding value. Miscellaneous feeds analyzed included Spanish moss, whole dehydrated sugar cane, clover hay, native hay, chick peas and alligator weed.

The Laboratory cooperated with the various departments of the University and of the Experiment Station by analyzing different materials used in research work. Last year these materials included sweet potatoes, hays, meat meals, shrimp meal, mixed feeds and a variety of fertilizers. Feed and mineral analyses were run on a number of range forage samples for the Southern Forest Experiment Station in New Orleans. Liming materials were analyzed for the Agricultural Adjustment Administration. Cooperative work involves from one or two samples in some cases to hundreds of samples in others.—*A. P. Kerr.*



Home Economics

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Nutrition Education Research—1944-1945

The project in Nutrition Education Research is well into the second year and studies are being made which are based on last year's exploratory work.¹ While this project is one which will require several years' work before any significant results can be realized it may be appropriate to report some of the developments and preliminary findings which give direction to the several aspects of the work presently in progress.

Preliminary Statement of First Year's Work

Food habits

A survey of food habits of 1,726 white children in public schools of Ascension Parish, Louisiana, shows that only 1.5 per cent of them have food habits which rate as good, 57 per cent of them have food habits which rate as fair, and 41.5 per cent of them have food habits which rate as poor.

According to Table 1, the most outstanding needs for improving the food habits of these children are:

1. Double the consumption of milk, eggs, non-citrus fruits and potatoes.
2. Triple the intake of citrus fruits or other sources of ascorbic acid.

TABLE 1. PERCENTAGE OF VARIOUS FOODS CONSUMED BY SCHOOL CHILDREN AS COMPARED WITH RECOMMENDED DIETARY STANDARDS, ASCENSION PARISH, LOUISIANA, DECEMBER 1944
(*White children only*)

	<i>Per cent</i>
Milk.....	46
Eggs.....	50
Fruit (non-citrus).....	57
Fruit (citrus).....	35
Meat (lean only).....	109
Whole Grains.....	29
Butter (also Margarine).....	23
Potatoes (Irish and sweet).....	57
Green Leafy Vegetables.....	19
Other Vegetables.....	110
(62 percent of Other Vegetables are peas and beans)	

¹ See Annual Report, Agricultural Experiment Station, Louisiana State University 1943-1944.

3. Increase the intake of whole grain cereals, butter or margarine and green leafy vegetables by four or five times.

While the foregoing interpretation is incomplete, the following conclusions seem valid:

1. Food habits in Ascension Parish are not consistent with those needed to produce well-fed individuals.
2. The survey of food habits yielded specific "needs" upon which to base a sound nutrition education program.

Dental conditions

A dental appraisal was made by the teachers, the nutritionist, and the public health nurse. It is recognized that this group is trained to make only a "screening" inspection; however, there should be little doubt as to the existence of obvious caries in a child's mouth. Under the conditions of this appraisal it was found that of the 2,240 white children studied in the public schools of Ascension Parish, Louisiana, 4 per cent had apparently sound teeth while 96 per cent had apparently carious teeth. Furthermore 22 per cent of the children have teeth *decayed but filled*, whereas 78 per cent of the children have *carious teeth which are not filled*.

On the basis of the above mentioned findings and others perhaps as significant, a program of nutrition-health education has been developed which provides three specific opportunities for experimental work this year. Such work is directed toward the initial purpose of the project: discovering ways to teach nutrition effectively.

Preliminary Statement of Second Year's Work

The development of school-community action on problems of nutrition and health through representative teacher committees

Representative teacher committees from the five white public schools in Ascension Parish spent two weeks, July 2-13, 1945, in determining plans for programs of education concerned with school-community problems of nutrition and health as evidenced by last year's surveys. The committee's work is continuous throughout the school year and records are being kept under three general headings, namely: (1) Objectives, (2) Activities and (3) Evidences of Success. Several follow-up meetings have been held in the separate schools for the purpose of evaluating the committee's work. One meeting of the five committees was held March 14, 1946, for the purpose of determining the effectiveness of *representative-committee ways* of teaching nutrition. Records of such meetings will be used as sources of data upon which to draw conclusions pertinent to this phase of the experimental work designed to continue for several years.

Ways of teaching nutrition in high schools

A study of the effectiveness of teaching nutrition to high school girls is under way in four white public schools in Ascension Parish. In general the study is designed with emphasis upon a selected pre-testing, teaching, re-testing procedure concerned with nutritional status, nutritional education and nutritional opportunity. The several groups co-operating in appraising nutritional status, and the specific indices for which they are responsible, are as follows: (1) Appraisals of food habits, dental conditions, height-weight-age relationships and general appearance were made by the Home Economics Department, Agricultural Experiment Station, Louisiana State University, and the four teachers responsible for the experimental classes in the Ascension Parish public schools. (2) Physical examinations were made, with particular attention to any defects which might rest on the basis of nutritional deficiencies, by the Nutritional Research Division of the Department of Internal Medicine of Tulane University Medical School. (3) Blood samples were taken by the Ascension Parish Public Health Unit. The samples were studied by the Department of Agricultural Chemistry and Biochemistry, Agricultural Experiment Station, Louisiana State University. Laboratory analyses made by the department included ascorbic acid determinations by the Mindlin and Butler macro method, and plasma protein and hemoglobin by specific gravity according to the method of Phillips, Van Slyke, *et al.* (4) Appraisals of general motor ability, made by the Department of Health and Physical Education, Louisiana State University, included tests of general body coordination, arm and shoulder strength, abdominal strength, agility and endurance.

The assumptions on which the study is based are: (1) When nutrition is taught effectively the results will be not only increased knowledge of nutrition but also improved practices of nutrition. (2) Improved practices of nutrition will be manifest in improved nutritional status. (3) Both nutritional knowledge and nutritional status are measurable, not by a single index but by many indices.

Data are being collected on this study.

Determining the effectiveness of personal interpretation and suggested uses of selected nutrition education materials for elementary teachers

It is assumed that nutrition education materials are of more value when personally interpreted by a nutritionist than they are without such interpretation. It is also assumed that nutrition education materials are of value when their use results in the increased knowledge and improved practices of the user.

Selected nutrition education materials were sent to all elementary teachers in Ascension Parish. Personal interpretations of those mate-

rials are being made to one of five groups of elementary teachers. All elementary teachers were given pencil and paper tests of nutrition information and practices at the beginning of the study. Such tests will be made again at the end of the school term. The group to which personal interpretations are made is the experimental group and *one* of the remaining four groups will serve as the control. This study is being made in cooperation with the Parish Supervisor of Instruction and the Supervisor of Materials, Ascension Parish, Louisiana.

—*Floy Eugenia Whitehead.*



Horticultural Research

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Introduction

Realizing that the maximum service of individuals or institutions can be accomplished only through close cooperation, this department works closely with other departments. The sweet potato project during the war years can be cited as an example of the cooperative efforts of a large number of individuals and departments, such as Nutrition, Home Economics, Dairy Research, Agricultural Economics, Agricultural Engineering, and also ten state experiment stations, the U. S. Department of Agriculture, and the Research Development Division of the U. S. Army Quartermaster Corps. All of these have contributed to solving the problems necessary to supply information for greater food production and utilization for the Army as well as civilians.

Sweet Potato Breeding

The season of 1944 proved to be the most fruitful one in the history of sweet potato breeding at this station, and more than 6,000 seedlings were grown. Particular emphasis has been given to breeding and studying of parental material which possesses superior characters such as higher carotene, higher starch, higher vitamins, and disease resistance. Making use of these better breeding stocks accounts largely for the success obtained this past season with the sweet potato breeding program. With more help available it was possible to analyze the progenies not only for disease resistance but also for starch, sugar, carotene, and proteins. Of the 89 previous-year starch and feed selections, 20 tested as low as 60 to 61 per cent moisture and 9 tested between 58 and 60 per cent, or a total solids of 40 to 42 per cent. Of the 1945 selections, 128 showed higher carotene color than the standard variety, Unit I Porto Rico. Forty-eight of these had the same skin color as the Unit I. An analysis of one of the best seedlings showed four times the carotene value of the standard variety. Of the previous year's selections, it will be noted in Table 1 that the three highest carotene seedlings were L 64, analyzing 588.64 micrograms per gram, L 132, analyzing 565.13 micrograms, and 28x6-42-1, analyzing 526.8 micrograms. All three of these show twice as much carotene as the Unit I Porto Rico. As for sugars, seedling 28x6-42-1 shows 37.69 per cent on a dry weight basis while seedling L 132 shows 34.46 per cent and our standard Unit I shows 23.97 per cent. The analysis for proteins showed that L 9 was the highest, analyzing 6.65 per cent on a dry weight basis while the Unit I showed 4.56. Dr. T. T. Ayers, Associate Pathologist of the Bureau of Plant In-

TABLE 1. ANALYSIS OF SELECTED VARIETIES AND SEEDLINGS SHOWING DRY WEIGHT, CAROTENE, TOTAL SUGARS ON DRY WEIGHT AND FRESH BASIS, AND PROTEINS AFTER THREE MONTHS STORAGE

Name	Dry Wt. %	Carotene, Dry Wt. Basis, Mgms./gm	Total Sugars as invert, Dry Wt. Basis, %	Total Sugars as invert, Fresh Wt. Basis, %	Protein, Dry Wt. Basis, %
Unit I.....	30.24	179.66	23.97	7.25	4.56
Queen Mary.....	26.69	332.22	26.02	6.95	3.75
Ranger.....	29.76	342.71	25.91	7.71	4.63
Pelican Processor (L 4-5).....	37.34	8.03	11.76	4.39	2.68
L 9.....	26.30	348.56	30.24	7.96	6.65
L 64.....	28.88	588.64	27.15	7.84	4.54
L 132.....	33.32	565.13	34.46	11.48	3.93
L 156.....	27.59	321.38	26.15	7.22	3.41
8 (2-1) x 71-42-1.....	37.60	10.1	13.89	5.22	3.67
28 x 6-42-1.....	31.13	526.82	37.69	11.73	4.21
98 x 43-1.....	30.19	210.89	26.47	7.99	3.94

dustry cooperating with this project, has found a considerable number of the older selections as well as the current selections to be resistant to wilt and soil rot. The Pelican Processor and 28x6-42-1 are the industrial potatoes which show resistance to wilt, while L 37 is the only table stock which shows promise of being wilt resistant.

As in previous war years, members of the staff worked closely with the Army on the dehydrated food program and over ten million pounds of dehydrated sweet potatoes were processed for the Army and relief agencies. Working through the certified seed agencies, this station continued to supply improved seed stock to not only our own state growers but also to the other states in carload movements. Also, working with the manufacturers of dehydration plants, five new feed dehydrators were erected and more than twice this number have been contracted for future delivery. At the present time there are ten canning factories and three more are in the process of being erected. The processing plants in the war years demonstrated clearly that by using the No. 2's for food processing and the culls for feed, a better price can be obtained for the No. 1's on the fresh market. Since 1940 this state has more than doubled its carlot movement of potatoes. As of May 1, 8,622 cars were shipped, and it is estimated that rail shipments alone will reach 10,000 for the season. Even to date this is a record movement for car shipments from this state or any other state.—*Julian C. Miller and Victor L. Guzman.*

Sweet Potatoes for Industrial Use

At the present time there is considerable interest in the production of sweet potatoes for livestock feed. A number of small and a few larger dehydration plants have been established in Louisiana and over the South in general. Some of these are using cull sweet potatoes in estab-

lished commercial shipping areas while others expect to use potatoes grown for the purpose of dehydrating for feed. In the latter cases high production of dry matter per acre produced economically is essential. Information concerning the production of sweet potatoes for industrial use is important.

For the last three years three kinds of sweet potatoes have been planted at two different dates and dug at three different times. A three-year summary of the results are given in Table 2.

The data presented show again that high yields of sweet potatoes can be produced for industrial purposes. The Triumph variety has been the standard for industrial purposes. Both the Pelican Processor and B-196 consistently outyielded the Triumph variety in bushels of sweet potatoes per acre and in dry matter produced. The Pelican Processor contained the greatest percentage of dry matter; the B-196 produced more dry matter per acre. The B-196 is very promising as a potato for industrial use. It tended to produce a high percentage of jumbo roots and it is likely that seed potatoes for this kind should be produced from vines set in June.—*W. D. Kimbrough.*

TABLE 2. YIELDS, MOISTURE CONTENT, AND CALCULATED DRY MATTER PER ACRE OF THREE VARIETIES OF SWEET POTATOES
Three Year Average 1944-45

<i>Name</i>	<i>Date of planting</i>	<i>Date of digging</i>	<i>Yield of marketable potatoes, bu. per acre</i>	<i>Moisture, per cent</i>	<i>Dry matter, pounds per acre</i>
Pelican Processor.....	<i>April</i>	<i>Sept.</i>	338.5	60.97	7,922.9
B-196.....	"	"	438.2	64.10	9,438.8
Triumph.....	"	"	316.6	65.72	6,511.8
Pelican Processor.....	<i>May</i>	<i>Sept.</i>	230.2	61.02	5,273.4
B-196.....	"	"	340.4	64.13	7,326.1
Triumph.....	"	"	245.6	65.49	5,085.4
Pelican Processor.....	<i>April</i>	<i>Oct.</i>	443.6	62.29	10,036.9
B-196.....	"	"	600.0	65.71	12,344.4
Triumph.....	"	"	405.9	66.25	8,219.5
Pelican Processor.....	<i>May</i>	<i>Oct.</i>	349.5	62.73	7,815.5
B-196.....	"	"	451.7	65.39	9,380.0
Triumph.....	"	"	293.3	66.52	5,891.5
Pelican Processor.....	<i>April</i>	<i>Nov.</i>	517.6	64.23	11,108.7
B-196.....	"	"	710.4	67.77	13,737.7
Triumph.....	"	"	455.1	66.10	9,256.7
Pelican Processor.....	<i>May</i>	<i>Nov.</i>	392.8	64.75	8,307.7
B-196.....	"	"	597.8	67.29	11,732.4
Triumph.....	"	"	343.7	67.46	6,710.4

Seasonal Change in Carotene Content of Sweet Potatoes of the Porto Rico Variety

Sweet potatoes are harvested in the lower South from July well into November. Potatoes dug during the summer are sold without being stored. The carotene content of sweet potatoes is important from the nutrition standpoint. During the 1945 season carotene was determined in samples of sweet potatoes that were dug at intervals during the growing season from vines set to the field at four different times from April 27 to July 6. The data obtained show that the date of planting had little effect on the carotene content of potatoes, except that it was lower in potatoes set to the field at the last date used. After the potatoes attained marketable size, if from plants set out before June 15, they contained as much carotene if dug early as did those from vines set at the same date that were dug late in the season. This indicates that potatoes of the Porto Rico variety that were dug and shipped early in the season should have been as good as those that were shipped later.

—*W. D. Kimbrough, E. A. Fieger, and Harvie Lewis.*

Waxing Stored Sweet Potatoes

Investigations were conducted to determine the effect of waxing of uncured and cured sweet potatoes on shrinkage and any change in moisture, starch, and sugar contents. There was less shrinkage in waxed potatoes than in unwaxed ones during a two-week curing period but after that there was little, if any, difference. During a storage period of four months there was no appreciable change in moisture, sugar, or starch content of the roots that could be attributed to the wax treatment. Waxing had no harmful effect on the quality of the sweet potatoes. The main benefit derived from waxing was the improved appearance of the sweet potatoes.—*M. H. Blow and W. D. Kimbrough.*

Breeding of Irish Potatoes

In addition to breeding for regional adaptability and market type, particular emphasis has been given to breeding varieties resistant to certain diseases. Two of the most descriptive diseases in connection with this breeding project have been spindle tuber and leaf roll. Since 1937 the station has been testing seedlings for resistance to spindle tuber. To date there are four seedlings which have not shown any sign of developing spindle tuber and have been grown now nine years adjacent to stocks which were known to carry this disease. These seedlings have been sent to Dr. Schultz, Pathologist of the U. S. Department of Agriculture, for further study. If any of these prove to be resistant it will be the first time in the history of potato breeding that any seedling has been found resistant to this disease. With leaf roll there are two problems to be considered. One is a genetic type of leaf roll which is found in

the Katahdin. This type of roll is found in a certain number of the progenies where Katahdin has been used as a parent. The second type of leaf roll is the true virus type. The characteristics of the genetic and virus leaf roll are similar. It has been decided by Dr. E. L. LeClerc, Pathologist of the U. S. Department of Agriculture, and the writer to discard any seedling which shows leaf roll, regardless of its origin. The two varieties, LaSalle and DeSoto, released by the station appear to be more suitable for fall production than potatoes of any other variety, and also produce very satisfactory crops from home-grown seed. The LaSalle has proved resistant to mosaic and the DeSoto more resistant to this disease than the Triumph. Both of these seedlings are higher in starch and total food value than the Triumph. The Triumph had 16.5 per cent total solids, DeSoto 18.9 per cent, and LaSalle 20.4 per cent in the 1945 fall crop.—*Julian C. Miller.*

Strawberry Breeding

The 50 best of 5,000 seedlings along with previous-year selections were tested for disease resistance, table quality, quick freezing, ascorbic acid, dry weight, soluble solids, flavor, aroma, and edible quality of the fruit. From the performance records for the past three years it was decided to name one of the new seedlings. This selection is a self seedling of the Fairmore, and the new variety was named Marion Bell. This variety was named after one of the graduate students who helped with the strawberry breeding project and was killed in World War II. The Marion Bell variety is very early in fruit production and the fruit is similar in shape and size to that of the Klonmore but has a brighter gloss, is firm, and has a good shipping quality. The plant is field resistant to leaf spot and scorch. Of the station introductions, the Konvoy still produces the highest yield, with Klonmore and Marion Bell following closely. The Konvoy and seedling L 27 were the two best for quick freezing. The Konvoy is the best home garden variety of any of the seedlings introduced. However, as a shipping and marketing berry, the Klonmore leads, and its popularity increases each year. Owing to the fact that the Klonmore is resistant to leaf spot and leaf scorch and does not have to be sprayed, like the Klondike, the growers who used the Klonmore saved from \$10 to \$15 an acre on the cost of spraying.

—*Julian C. Miller, W. D. Kimbrough, and W. F. Wilson.*

Breeding of Pole Beans

At the present time there are but few stringless pole snap beans and what few varieties there are, are not ideally suited for Louisiana conditions. In 1938 a breeding project was begun to breed better varieties of pole snap beans. Crosses were made between the Giant Stringless Greenpod and Kentucky Wonder and later some of the selections from the above crosses were outcrossed to the Savage bean. This was a native bean selected by Mrs. W. E. Savage of Marion, Louisiana. Pure lines



Three strawberry varieties bred and released by the Louisiana Experiment Station. Left to right: Konvoy, leading home garden variety; Marion Bell; and Klonmore, the latter two commercial varieties. It is estimated that approximately 80 per cent of Louisiana's strawberry acreage is now planted to the Klonmore,

are being selected from the Savage. At the present time around 50 superior selections are being grown and tested for yield, quality, and resistance to rust. There are three months during the summer when pole beans can be grown and bunch beans cannot be grown profitably. Also, the demand for fresh and canned pole beans is much greater than that for the bush type. It is hoped that breeding better varieties for the home, market, and canners will enable Louisiana growers to extend their season of bean production and supply a better quality bean to the consumer.—*Julian C. Miller.*

Breeding Lima Beans

Lima beans are among the most nutritious of all vegetable crops and since large-seeded limas do not grow well in the South, it was decided to begin a breeding program by crossing large-seeded limas, such as the Fordhook, with the most productive type, such as Carolina Pole. In 1940 crosses between the Fordhook and Carolina Pole were made with the object of breeding more prolific larger seeded beans. A large number of progenies were grown and 40 of the best seedlings were saved for further study. All of the plants of the F_1 , or the first generation, cross showed the pole or vining character and intermediate pod and seed size.

The vines showed an extremely high degree of hybrid vigor. Most of the progenies continued to be intermediate in pod and seed size as compared to the parental types. A few segregated for large size, L 19 and L 39; however they are not quite as large as the parent, Fordhook. There appeared to be a close linkage between a large-sized seed and late maturity and small seed and early maturity. In order to further select for regional adaptability, the better large-seeded selections will be backcrossed to varieties of the Fordhook type.—*Julian C. Miller.*

Gladiolus

A further study of varieties adapted to this area has been made. Only a few of the varieties tested have been found worthy of special recommendation as yet. No red variety has been found to be too reliable. Valeria was tried last year and seemed promising and worth a trial. This variety is somewhat similar to Dr. Bennett except that the plants are more vigorous and the blooms more consistently good in case of Valeria. Another red variety that may produce splendid blooms is Rewi Fallu. This very dark red variety should be grown by those who want something a little different, even though the variety cannot be recommended without reservation.

Because of the comparatively few varieties that seem to be well adapted in this area, a breeding program has been started with gladiolus. It is hoped that some superior varieties may be developed for this section.—*W. D. Kimbrough.*

Plant Pathology

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Hot-Water Treatment of Sugar Cane

The five-year test of the hot-water treatment of sugar cane requested by the American Sugarcane League was completed in 1945. Test plots on nine different plantations were planted with seed cane treated with hot water at 52° C. Plantings were made each year in August, September, October and November.

In September, October and November plantings, in the plots planted with hot-water treated seed cane, the stands were better and the yields were considerably higher. With the variety C.P. 29/320, the hot-water treatment was responsible for increased yields of 3½ to 4 tons per acre. Similar increases were obtained with many of the other varieties. The hot-water treatment is not at present recommended for Co. 290 and C.P. 29/116, nor is it recommended for August plantings.

—P. H. Dunckelman and C. W. Edgerton.

Control of Nematodes by Soil Treatment

In 1944, preliminary tests indicated that the application of the chemical commonly known as DD to the soil has possibilities as a practical control measure for nematodes of tomatoes. More extensive studies were made on tomatoes, cucumbers and okra. For crops planted in hills, such as tomatoes, cucumbers, squash, egg plants and peppers, 5 cc. of the DD chemical should be applied in each hill. This has been done by punching holes approximately six inches deep, pouring in the material and immediately closing the holes. Transplanting or planting of seed should not be done before 12 to 15 days after treatment, and if the soil remains excessively wet a somewhat longer period is

	Number of plants showing severity of nematode				
	No infection	Trace	Light	Moderate	Severe
<i>Tomatoes</i>					
Treated hills.....	94	14	0	0	0
Non-treated hills.....	0	0	0	19	108
<i>Cucumbers</i>					
Treated hills.....	279	27	15	4	1
Non-treated hills.....	20	33	25	78	145



Nematode Control on Okra with DD
Left, not treated; right, treated with DD.

necessary. Almost perfect control of nematodes was obtained on tomatoes and cucumbers by following this procedure, as is shown in the table on page 79.



Nematode Control on Okra with DD
Left, treated with DD; right, not treated.

Excellent control of nematodes was obtained on okra by treating the soil with a 5 cc. dosage at 12-inch intervals on the row bed, 15 days before the seed was planted. Three weeks after emergence the plants in the treated plots were larger and greener than those in the non-treated plots. This difference became more pronounced throughout the growing period. The plants in the non-treated plots became yellow in color, shed the lower leaves prematurely, produced few pods and were dead before the end of the normal season, while those in the treated plots grew vigorously and produced a normal crop of pods. At various intervals throughout the season, plants were removed and examined for presence of nematode galls. The plants from the non-treated soil had an abundance of nematode galls while those from the treated soil remained free from galls.—*L. H. Person and S. J. P. Chilton.*

Fermate Controls the Mildew and Anthracnose Diseases of Cucumbers

For a number of years good control of cucumber mildew has been obtained by dusting with certain copper containing dusts. These materials have controlled the disease as satisfactorily as Bordeaux mixture, and have caused much less injury to the foliage. Higher yields of marketable fruit have been obtained from dusted fields than from fields sprayed with Bordeaux mixture. The higher cost of materials for dusting, however, has limited the use of dusts in the fall cucumber growing area. Recent studies of mildew control have therefore been directed



Effect of Spray Compounds on Cucumber Foliage
Left, burning produced by Bordeaux mixture; right; no injury produced by Fermate.

towards finding a spray material equal to Bordeaux mixture in disease control and non-toxic to the cucumber plant or one which will cost less. The proprietary copper fungicides, when used as sprays, have been found to be ineffective in controlling the disease. In 1945, a season of moderately severe mildew, dithane appeared to give good mildew control without seeming to cause any injury. The yields, however, from plants sprayed with dithane were no better than from those sprayed with Bordeaux. Dusts containing 3 per cent cuprocide or 8 per cent tribasic copper sulphate were equal to dusts containing 5 per cent and 12 per cent of the respective materials in mildew control. The 3 per cent cuprocide dust caused less injury than the 5 per cent dust and produced a larger yield of fruit. A dust containing 10 per cent Fermate was also highly effective and caused no injury.

During the past two years, the mildew control program has been complicated by epidemics of anthracnose. None of the copper dusts was sufficiently effective against this disease to be of practical value. Bordeaux mixture and dithane sprays were about equally effective, but under favorable conditions for disease development, such as occurred in 1945, these materials gave only partial control. Fermate on the other hand offered practically complete control throughout the growing and harvest season. Yields in bushels per acre from plots in which anthracnose was severe were 460.9, 290.7, 244.3, 233.5, 232.8, 222.2 and 154.8 for Fermate, 3 per cent cuprocide dust, 5 per cent cuprocide, dithane spray,



Controlling Cucumber Diseases with Fermate
Left, dusted with copper; center, dusted with Fermate.

Bordeaux spray, 12 per cent tribasic copper sulphate, and 8 per cent tribasic copper sulphate, respectively. The yields from Fermate-dusted plots were almost twice as large as those from plots dusted or sprayed with other materials.—*F. J. LeBeau.*

Treating East Lily Bulbs Affected with the Black Scale Disease

The black scale disease has continued to be a serious threat to the lily industry in South Louisiana. While the certification program has slowed up the spread of the disease, it nevertheless has become clear that a more positive method of control will be necessary if the disease is to be brought under control. The treatment of diseased bulbs with a number of inorganic metallic fungicides failed to offer much promise in that direction; and so in more recent work, extensive tests have been made with the newer organic fungicides.

One of these materials, an organic mercurial known by the trade name "Puratized," was found to be highly effective in destroying the disease organism in diseased tissue. When diseased bulbs were treated and planted in the greenhouse or in the field, the development of black scale was kept under 10 per cent. The chemical was found to be effective over a wide range of concentrations and with different times of treat-



Treating Easter Lily Bulbs for Black Scale
Upper, not treated; lower, treated with Puratized.

ment. Which combination of concentration and length of treatment is the best still remains to be determined; but from tests so far made, it appears that treatment of 24 or 48 hours is necessary.

In the fall of 1945, popular demand and the possibility of total failure of the certification program made it advisable, despite the fact that only one year's results were available, to make the treatment available to as many growers as possible, and under as close supervision as was possible.

A concentration of 1-2,000 of the chemical for 48 hours of treatment was chosen for these large-scale treatments. Over 2,000 bushels of bulbs were treated and planted in the months of September, October and November. While the results, from the standpoint of black scale control, will not be available before harvest, it is apparent that the treatment was in no way detrimental to the bulbs.—F. J. LeBeau.

Weed Control Studies

2,4-D on Various Weeds

In preliminary tests, the 2,4-D derivatives have been found very efficient in killing many troublesome weeds, such as weeds in the rice fields, cockleburs, milkweeds in sugar cane fields, Cherokee and Chickasaw rose bushes in pastures, ragweeds and many others.

Special attention has been given to the weeds found growing in rice, because the rice farmers pay around \$2.50 per acre to hand pull only one kind of weed, namely indigo. The rice weeds reduce the yield of rice, and deductions of 10 to 35 cents per barrel are made when weed seeds occur in milled rice. Some of the more important rice weeds are indigo, *Sesbania macrocarpa*; curly or silvery indigo, *Aeschynomene virginica*; Mexican weed, *Caperonia castaneaefolia*; dayflower, bat wing or turtle back, *Commelina* spp; redweed, *Melochia corchorifolia*; toothcups, *Ammania coccinea*; mule-ear, *Heteranthera dubia*; Sagittaria, *Sagittaria* spp.; yellow sedge, *Cyperus iria*; tadpole sedge, *Rynchospora corniculata*; goose weed, *Sphenoclea zeylanica*; several species of *Eleocharis*, *Carex*, *Cyperus* and numerous grasses.

The tests have shown that indigo, redweed, turtle back, mule-ear, yellow sedge and related sedges are easily killed by the 2,4-D compounds. Consistent killing was not obtained on large plants of curly indigo, Mexican weed, goose weed, and Sagittaria. No apparent injury was evident on rice over 18 inches tall, but in greenhouse tests, the seedlings showed some stunting. Additional work is necessary before specific recommendations can be made.

Many lawns are infested with a plant which is rapidly spreading, *Soliva sessilis*. Because of the sharp spurs on the fruits, this plant is locally called "bur grass." The plant is not a grass, however, and so the name "spur weed" would be more appropriate. This plant has been

killed with the ethyl and methyl esters of 2,4-D. These compounds also kill carpet grass and may produce injury on nearby ornamentals. Iron sulphate or green vitrol used at the rate of one pound to one gallon of water per 100 square feet will produce an effective kill of spur weed without some of the disadvantages associated with the 2,4-D compounds. The iron sulphate will turn the lawn black, but the grass will soon grow back.

Controlling Alligator Weed with 2,4-D and Its Derivatives

At the 1944 session of the State Legislature, an appropriation was made to study the alligator weed and to investigate various measures of control. This weed has become a serious pest not only in the lakes and waterways, but has also become established in cultivated fields in South Louisiana. It has become particularly troublesome in sugar cane fields and in fields of truck crops. As it is also advancing into the rice belt, it is feared that the weed may become a serious pest in the rice fields in the future.

Many tests have been made, or are under way, to determine whether the alligator weed can be killed out in fields by spraying with chemicals. Two types of chemicals have been used, the caustic herbicides and the newly discovered hormones, the 2,4-D compounds.

It has been found that the alligator weed could be seriously injured or even killed with certain of the caustic herbicides such as the chlorates, borax and ammate, but the general use of these compounds does not seem practical.

The 2,4-D compounds seem much more promising. These compounds not only kill the tops above ground, but are also translocated down into the roots. These substances proved very effective when sprayed on alligator weeds during the summer months. A large percentage of the plants were killed and regrowth was definitely retarded on the others for a period of two to four months. The results which have been obtained justify large-scale tests during the coming season. This study is being made in cooperation with the Department of Botany, Bacteriology and Plant Pathology of the College of Arts and Sciences, and the Department of Agricultural Engineering of the College of Agriculture.—*C. A. Brown.*¹

Blakemore Yellows of Strawberry

What appeared to be "Blakemore yellows" of strawberry appeared in several plantings of the Klonmore variety in the spring of 1945. While it is probable that this trouble had appeared previously in this variety, it appeared to have been more widespread in 1945 than previously. No

¹ A staff member of the Department of Botany, Louisiana State University, collaborating with the Plant Pathology Research Department.

peculiar condition of environment seemed to have been associated with the trouble in the 1945 season. Badly affected plants appeared during the latter part of April. Increasing numbers of yellowed plants appeared thereafter. It was observed that affected plants rapidly died out. Dying was especially rapid with the advent of higher temperatures in June. Plants transplanted in June failed to recover while the majority of healthy plants transplanted at the same time survived. To what extent yellows-affected plants survive through the summer will have an important bearing on the future importance of the disease.—*F. J. LeBeau.*

Spraying Controls the Blight of Arborvitae

In continuing the work on the blight disease of arborvitae, studies have been made on the effects of different fungicides as well as time of application of fungicides on disease control. Tribasic copper sulphate, 4 pounds to 100 gallons of water; dithane, 2 quarts to 100 gallons of water; and Bordeaux 4-4-50 effectively controlled the disease when three applications were made at monthly intervals beginning in the first week of June. Good control was also obtained with two applications of Bordeaux mixture, one in June and one in July, and also with a single application of Bordeaux mixture made in June. Thus it appears that the blight of arborvitae may be controlled by a single, properly timed application of a suitable fungicide.—*F. J. LeBeau.*

Rice Disease Investigations

Use of Fertilizer in Root-Rot Infested Rice Fields

Many root rot or alkali areas occur in rice fields of Southwest Louisiana. In previous tests, it was found that an application of fertilizer materially increased the yields in these areas. In order to claim maximum yields from the fertilizer, however, it was necessary to have the fields drained before applying the fertilizer. Ordinarily to drain these areas, it was necessary to drain whole fields. This suggested that the fertilizer might also be profitably applied to the non-root rot areas. Tests were therefore made in 1944 and 1945 to determine whether the non-root rot areas could be treated at the same time as the root rot areas. The tests were made on 25 farms in 10 parishes. The results were as follows: In 27 tests, 400 pounds of 10-10-0 fertilizer averaged 4.7 barrels per acre increase; in 29 tests, 300 pounds of 13-7-0 averaged 3.7 barrels per acre increase; in 31 tests, 200 pounds of 20-0-0 averaged 3.6 barrels per acre increase; and in 26 tests, 200 pounds of 10-10-0 averaged 2.5 barrels per acre increase. The applications of 400 pounds of 10-10-0 gave the most consistent results, 2 or more barrels increase in 96 per cent of the tests, 3 or more barrels in 89 per cent of the tests, and 4 or more barrels in 63 per cent of the tests. The applications of 300 pounds of 13-7-0 gave increases of 2 or more barrels in 93 per cent of the tests, 3 or more bar-

rels in 70 per cent of the tests, and 4 or more barrels in 35 per cent of the tests. The applications of 200 pounds of 20-0-0 gave 2 or more barrels increase in 87 per cent of the tests, 3 or more barrels in 68 per cent of the tests, and 4 or more barrels in 36 per cent of the tests. The applications of 200 pounds 10-10-0 gave 2 or more barrels in 58 per cent of the tests, 3 or more barrels in 42 per cent of the tests, and 4 or more barrels in 19 per cent of the tests.

A comparison of ammonium sulphate, cyanamid, and sodium nitrate as nitrogen sources in four tests gave increases of 3.4 barrels, 2.2 barrels, and 2.4 barrels, respectively. In six tests where ammonium sulphate, cyanamid, and sodium nitrate plus 100 pounds phosphate were compared, increases per acre were 3.9 barrels, 1.6 barrels, and 2.0 barrels, respectively.—*S. J. P. Chilton and T. C. Ryker.*

White Tip and Fertilizer

An opportunity was found on two farms to test the effect of top-dressing on white tip of rice. In the two tests, 400 pounds of a 10-10-0 fertilizer per acre increased yields 4.6 barrels; 300 pounds of a 13-7-0 increased yields 4.4 barrels; 200 pounds of a 20-0-0, 2 barrels per acre; and 200 pounds of a 10-10-0, 2.2 barrels per acre.

—*S. J. P. Chilton and T. C. Ryker.*

Treating Rice Seed with Fungicides

If it is possible to obtain satisfactory stands of rice by sowing the seeds in flooded fields, then a satisfactory control of such weeds as red rice, indigo, and Mexican weed should be obtained. As this method of planting has given erratic results in the past, it was thought that seed treatment might be of value. In preliminary tests in 1945, seed were treated with Arasan and yellow cuprocid, soaked in water for 24 hours, and then seeded in six inches of water, the water being retained on the land. Three plantings were made in April, with Rexoro and Blue Rose varieties. Satisfactory stands were obtained in both treated and untreated seed in the first planting, but plants from seed treated with yellow cuprocid were slightly better and emerged from the water a day or two earlier. In the second and third plantings, yellow cuprocid-treated seed gave considerably better stands than the untreated seed. In one planting, however, made the middle of May, relatively few plants came up from either treated or untreated seed. Arasan was of little value.

—*S. J. P. Chilton and T. C. Ryker.*

A New Race of *Cercospora Oryzae* on Rexoro

In 1944, a few plants of the rice variety Rexoro, which had been resistant to the *Cercospora* leaf spot fungus since its release, were found infected. In 1945, Rexoro, from Rapides Parish to Acadia Parish, was severely attacked by the disease. Inoculation tests made at the station

showed that a new race of the fungus causing the disease was present in the Louisiana rice area. Of the commercial varieties, Blue Rose, Blue Rose 41, Nira, Caloro, Fortuna, Magnolia, Zenith, and Delrex were resistant to this new race. Besides Rexoro, Blue Bonnet, Texas Patna and Nirex were susceptible. A number of selections and hybrids of the Rexoro type were found to be resistant. These will be increased and tested for possible release.—*S. J. P. Chilton.*

Sweet Potato Disease Studies

Soil Rot of Sweet Potatoes Controlled by Applying Sulphur

The soil rot has caused very heavy losses on sweet potatoes in certain sections of the state, especially in the vicinity of Sunset in St. Landry Parish. When conditions are favorable, especially in dry weather, the young roots rot off as fast as they develop. The plants either die or do not make vines.

The organism causing the disease will not attack the plants in an acid soil where the pH is below 5.2. As the pH of the soil in the Sunset area is around 5.7, conditions are favorable for the development of the disease.

It has been found that it is possible to lower the pH of the soil to 5.0 by the addition of sulphur. Soil treatment with 600 to 800 pounds of sulphur per acre has given satisfactory control of the disease. In tests carried on through a period of eight years, it has been found that an original application of 600 to 700 pounds of sulphur will give practical field control for a period of 5 to 6 years and possibly more. In dry years, the sulphur treatment has given increases in yield of from 50 to 160 crates per acre. It has been recommended that after about 5 to 6 years, the fields should receive a second application of about 300 pounds of sulphur.

Black Rot of Sweet Potatoes

Black rot is becoming increasingly important in the commercial sweet potato growing area, and is seriously threatening the industry. While it is recognized that the disease can be satisfactorily controlled by the use of disease-free seed properly treated with one of the standard recommended seed treatments before bedding, and following a suitable three-year rotation, this disease is still spreading at an alarming rate. The seriousness of the disease has become apparent during the past few years since commercial shippers have changed from the brushing process to the mechanical washing process in preparing the potatoes for shipment to markets. Investigations are in process to find, if possible, a material that can be used as a treatment in the washing process to give satisfactory control of the disease.—*L. H. Person.*

Vegetable Seed Treatment

In some seasons, especially when planting is made early in the spring, considerable difficulty is experienced in obtaining satisfactory stands of some vegetable crops, unless an excessive amount of seed is planted. Seed treatment tests were carried out on cucumbers and squash, using Arasan and Spergon as seed protectants. The percentages of emergence of seedlings were: Cucumber—control 31.2, Arasan 77.1, and Spergon 73.5; squash—control 40.5, Arasan 82.6, and Spergon 80.0. In addition to increasing the seedling emergence, the seedlings in the treated plots 16 days after planting were definitely larger than those in the control plots.—*L. H. Person and S. J. P. Chilton.*

Shallot and Onion Disease Studies

Soil Treatment for Control of Shallot White Rot

White rot of shallot, onion and garlic has been studied for the past three years with special emphasis upon control measures. Early varietal tests in infested soil indicated that none of the locally grown varieties shows appreciable resistance to the disease. For this reason most of the work was concentrated on soil treatment tests.

Early tests showed that the white rot fungus grew well on certain acid culture media, but was definitely limited on alkaline media. Since the soils where white rot has been found are definitely acid, lime was applied in an effort to reduce the acidity. Lime applications as high as 3,000 pounds per acre reduced the severity of the disease on shallots to some extent. In one year's test the treated plots gave a satisfactory crop (about 80 per cent good bunches), while the crop on the untreated plots was about 50 per cent normal.

The application of certain chemicals to the soil around growing shallot plants gave excellent control of white rot in small preliminary tests. Semesan at the rate of 1 ounce to $1\frac{1}{2}$ gallons of water and mercury bichloride 1-500, were applied around shallot plants 3-5 inches tall so as to wet the soil around the basal portions of the plants. The liquid was applied at the rate of about one gallon to 30 row feet. When the shallots were pulled three months later, all the bunches in the plots treated with Semesan and mercury bichloride were in salable condition, while only 10 to 30 per cent of the bunches from the untreated plots could be sold. These early tests indicate that white rot can be greatly reduced in severity on the most heavily infected soil by the application of Semesan or mercury bichloride around the shallot plants before the disease has begun to attack them. This treatment might be practical on small heavily infected areas.

Yellow Dwarf Virus in Shallot

Several years ago, small numbers of shallots were found infected with yellow dwarf. The disease has been spreading progressively in many fields since that time. At present it is scattered over the entire shallot producing area and is becoming widespread in the sections where seed sets are grown. Certain shallot plots being grown for stock seed were recently found to be heavily infected with yellow dwarf. This seed will make very poor planting material and should not be used. Efforts are being made to develop seed stocks free of the disease. Yellow dwarf is a definite threat to the shallot industry, and may prove a very difficult disease to control.

Mildew on Shallots and Onions

Mildew is ordinarily not a common disease of shallots in Louisiana. During the past several years it has been observed only a few times, and never more than an occasional infected plant was found. But in the spring of 1946, the disease was widespread in the same general areas where it occurred on onions. Some fields were rather severely damaged, the green leaves being killed back and discolored so badly as to make them unsuitable for market. Other small plantings were so severely damaged that they were not pulled. Certain growers were compelled to pull their shallots while they were immature in order to avoid total loss from mildew. The losses from mildew in the shallot producing areas were not large, but the outbreak of the disease this season shows that when conditions are especially favorable the shallot may be severely affected.

Onions in the Bayou Lafourche area have been severely damaged by mildew periodically for many years. In these bad years, the crop may be almost a total loss. The bulbs that do develop are small and are inclined to rot badly in storage. The worst epidemic of mildew in recent years developed in the spring of 1946. It was widespread over the entire Lafourche area on onions for bulbs, and was especially destructive on plants being grown for seed. Unless some control method is developed for this disease, many of the onion growers in the affected areas may have to go out of business. Spray tests for mildew control are being conducted at present.—*E. C. Tims.*

Poultry Research¹

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Physiology of the Avian Thyroid

The effect of various hormonal substances on the market quality of male birds is receiving considerable attention. Somewhat similar experiments were undertaken in this department, but with a different objective in mind. Study is being made of the effect of hypothyroidism on the sexual development and subsequent reproductive capacity of males fed varying amounts of thiouracil. The objective is to determine if future breeding males can be retarded in sexual development, to prevent loss of birds by fighting during the growing period and while the males are being held for sale or for use in the breeding pen. Losses among such valuable males may amount to 10 per cent or more of those kept. On the basis of one year's results it appears that thiouracil may be used to retard sexual development without injuring the reproductive capacity of the males. Substantiation of the results and further study as to the optimum level of feeding thiouracil will be made.

The possible effect of hyperthyroidism, induced by feeding protomone, in prolonging the laying period or delaying the molt, is under study. Studies concerning the influence of relative humidity on thyroid activity of young chicks and the influence of the quality and quantity of light on thyroid activity are also being made. These experiments have not progressed far enough to be conclusive, although interesting results are indicated.—*J. P. Mixner,² B. A. Tower and C. W. Upp.*

Adequate Supply of Green Feed Makes Simple Rations Satisfactory

Increased knowledge of nutrition has led to the development and use of quite complicated mash formulas for laying and breeding flocks. The results obtained with simple rations, plus adequate green feed, do not reflect discredit on more exactly "complete" rations but they are of practical importance for two reasons. First, they show conclusively that satisfactory, although not excellent, results can be obtained with simple diets; and second, that farmers can obtain an average egg production of 135 to 155 eggs per hen using laying mash with only one protein ingredient, *when good green feed is provided*. Such sources of protein as shrimp meal, cottonseed meal, peanut meal and soy bean meal have been

¹ For reports of poultry work at the North Louisiana Experiment Station, see pages 117-118.

² A staff member of the Department of Zoology, Louisiana State University, collaborating with the Poultry Research Department.

used singly in the laying mash for three years with results equal to or superior to those indicated above. Similar results were obtained when a 32 per cent protein-vitamin supplement was fed with corn and oats ad libitum as the grain feed. The margin over feed cost differed little for the several rations because the rations which yielded fewer eggs cost less. An exception to this rule was the cottonseed meal pen at Baton Rouge this past year. In this case the net income was less because the hens in this pen laid fewer fall and winter eggs, when eggs were higher in price. In the trial at the North Louisiana station, on the other hand, the annual production in the cottonseed meal pen was equal to that of any of the other pens, although fall-winter production was slightly lower.

Hatchability of the eggs, body weight of the hens and egg weight have been consistently satisfactory. The per cent of the birds that lived through the experimental year was quite high in all pens, ranging from 96 per cent in the complex mash and cottonseed meal pens to 84 per cent in the peanut meal pen. Mortality and culling combined varied from 4 per cent in the cottonseed meal pen to 20 per cent in the 32 per cent supplement pen. These experiments have demonstrated conclusively that when good stock is used the annual egg production of Louisiana hens can be doubled even with simple rations if an adequate green feed program is put into effect. The green feed crops used were rye grass and white Dutch clover for winter-spring grazing and lespedeza, bermuda grass and carpet grass for summer-fall grazing. Poultry pastures save on feed cost, improve the health of the layers and increase egg production.—*B. A. Tower and C. W. Upp.*

Farm Egg Coolers and Frequent Marketing Important in Maintaining Egg Quality

Extensive experiments in which the quality of thousands of eggs was carefully checked individually (several times for each egg) have proved the falsity of the statement that "Louisiana eggs are of low quality and will not keep in storage." The results have just as conclusively shown, however, that Louisiana eggs of finest quality will surely deteriorate if (1) improperly kept or (2) if kept too long. Since many eggs are not cared for properly on Louisiana farms and since eggs deteriorate so rapidly during summer weather, there is a basis for the poor reputation that Louisiana eggs have with market men. It need not be so, however, and is not true of eggs that are held under proper conditions and are moved to market twice a week or more often. Egg quality is maintained better by means of refrigeration than by non-refrigerated coolers, as might be expected. The farm egg coolers in turn maintain quality better than "room temperature" conditions. The importance of length of time held and of conditions under which the eggs are held are well illustrated by the brief table on the following page.

EFFECT OF HOLDING CONDITIONS AND LENGTH OF TIME HELD ON GRADE OF EGGS

(Figures given as per cent of egg in each grade.)

Grade.....	When gath- ered		Number Days Eggs were Held																				
			1			2			3			4			5			6			7		
	A	B	A	B	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
Refrigerator....	92	7	86	14	75	24	1	77	23	0	69	31	1	68	31	1	69	30	1	60	40	0	
Farm Egg Coolers*.....	90	10	74	26	68	32	0	64	36	0	57	42	1	55	44	1	44	53	3	36	59	5	
Room Temperature.	92	8	71	29	61	39	0	51	49	0	42	58	0	31	68	1	17	80	3	8	78	14	

*The four coolers used were humidor, vertical tile, horizontal tile, and oil drum. The latter two are cave type, the second is an underground cooler and the first named is a burlap-evaporation type cooler.

Eggs held in farm egg coolers were shipped via express to market (from Baton Rouge to Shreveport and to New Orleans), where they were regraded by federal-state graders. They held up well, especially those held four days or less before shipment. Some lots of eggs were placed in cold storage and maintained quality in an entirely satisfactory manner. The mold which developed after cold storage in cooler-held eggs last year was avoided entirely this year (1) by fumigating the coolers with formaldehyde and potassium permanganate and (2) by holding the eggs in wire baskets rather than in cases.

At the suggestion of a Louisiana hatcheryman, hatching eggs were held in coolers (for one to seven days) and were subsequently set and hatched. The hatching results for these eggs held in late April and May were entirely satisfactory for eggs held in the coolers and for those held at room temperature. The weather was mild during the holding period.—C. W. Upp and B. A. Tower.

Improvement by Breeding

Improvement of the breeding flocks of the state by the best known breeding methods is recognized as an important step toward increasing the productive efficiency of all poultry flocks in Louisiana. The better breeding flocks serve a similar purpose to the production of better seed for the improvement of field crops. The production and distribution of Record of Production chicks through the Poultry Breeding Project has been carried on for the past five years to speed up the distribution of good stock. Numerous private breeders are now contributing to the supply of better bred stock that is available in the state. A few figures concerning the Poultry Breeding Project stock will show the progress that is being made. This past year two hundred and thirty-eight pullets

qualified as R.O.P. hens with an average production of 227.1 eggs. Not only must hens lay 200 or more eggs of standard size but they are required to have the size, type and color characteristic of their particular variety and must be free of disqualifying defects. In addition they must react negatively to the pullorum test each year. The high hen of each of the four varieties used laid: Rhode Island Red, 322 eggs; Barred Plymouth Rock, 314 eggs; New Hampshire, 286 eggs, and White Plymouth Rock, 293 eggs. These records are given not because individual records are all-important; as a matter of fact, high egg records of individual hens are often over-stressed. Much more importance is attached to the average record of a family (e.g., a group of 8 or 10 full sisters) than to an especially high record of one individual. The feasibility of improving the productive qualities and the viability of Leghorns by use of the progeny test or family breeding has been well demonstrated in experiments at this and other experiment stations. The same method is in use in improving the dual purpose breeds in the Poultry Breeding Project. R.O.P., S. C. W. Leghorns and White Wyandottes in addition to the breeds mentioned above are being produced by private breeders in the state. There has been a decided increase in the demand for New Hampshires since 1942. In that year more were produced than were required but at present the demand exceeds the supply.

A second approach to the improvement of breeding stock has been made this past year, viz, by the elimination of inherited defects from otherwise superior stock. Certain defects of comb and beak appeared in some of our R.O.P. stock. Special matings have been made to determine (1) whether these defects were inherited; (2) if inherited, the mode of inheritance; and (3) methods of eliminating the defects.

—B. A. Tower and C. W. Upp.

Experimental Dry Rendering Unit

In an effort to reduce cooking time, refinements in construction and in air flow have been made in the dry rendering unit constructed last year and referred to in the preceding Louisiana Station Annual Report. Poultry offal has been rendered satisfactorily in this vat. The design and operation of the press for extracting the fat from the rendered tankage is at present receiving attention. Improvement is needed in order to produce a finished protein supplement of relatively low fat content and desirable physical properties. Rendered pressed and dried poultry offal is to be tested with chicks and with hens to establish its value as a poultry feed stuff.—O. E. Goff and C. W. Upp.

Coccidiosis Control

Chickens reared in colony houses, with outdoor yards, and fed a ration containing sulphur and charcoal produced greater gains than did

cnicks grown under the same conditions but fed a ration which did not contain these two substances, or one containing sulfaguanidine.

The chick mortality in all lots was low, even though growing stock and mature birds have been kept on these yards for several years, when not being used by experimental chicks, in an effort to increase contamination. This method of contamination has been resorted to so that natural infection might be secured and the value of sulphur in coccidiosis prevention be studied under these conditions. The low mortality in all lots, regardless of ration or medicant used, illustrates the fact that a control lot must always be maintained. Infection and mortality will vary markedly from one year to the next. It is often the absence of a disease and not the treatment resorted to that prevents the appearance of that disease.

Chicks reared in lamp-heated brooders, exposed to the direct rays of the sun, and fed a ration containing $2\frac{1}{2}$ per cent sulphur and $2\frac{1}{2}$ per cent charcoal, produced greater gains and utilized their feed more efficiently than did chicks fed rations containing $\frac{1}{2}$ per cent or 1 per cent sulfaguanidine or $\frac{1}{2}$ per cent or 1 per cent of a urea-sulphur mixture.

—O. E. Goff.



Rural Sociology

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Medical Personnel, Facilities and Services in Louisiana

Preliminary analysis of accumulated data reveals the following:

1. In 1945, after losses to the armed forces, Louisiana had one doctor for each 1,464 people, which was slightly better than the minimum standard set by the Surgeon General of the United States for wartime medical care. However, with the distribution that existed, the nine most urban parishes had a ratio of one doctor for each 926 people, and the other 57 parishes had only one doctor for each 2,739 people. Eight parishes actually had more than 5,000 people for each physician, but half of these were adjacent to urban parishes with much better ratios. In recent years there has been a decided tendency for young men entering the profession to locate in the larger urban centers of the state, so the distribution relative to population is becoming less equitable. Twenty-eight per cent of the babies born in the state during the period 1940-1942 had no physician in attendance. The parish variations were very great, only 8 per cent being without medical attention in La Salle, while in West Feliciana, with its very high proportion of Negroes, 76 per cent were born without a doctor.

2. Forty-four parishes have at least one hospital or clinic containing twelve or more beds. Forty-seven have facilities for appendectomies, and in 50 parishes tonsillectomies are performed. Though ranking twenty-second in the nation in ratio of general hospital beds to population, Louisiana still ranks well above all other Southern states. This relatively high position, however, is due in part to the rather large state-hospital program, and since so many of these beds are concentrated in the city of New Orleans, many areas of the state have no adequate hospital facilities reasonably accessible.

3. Eighty-seven and one-half per cent of the parishes in Louisiana are served by local health units, and there are only two other Southern states (Alabama and South Carolina) in which a greater percentage of counties have this service.

4. As in most predominantly rural states, three basic problems that have been present in Louisiana are (1) lack of medical care facilities and services, (2) lack of appreciation by many people for the need of adequate medical care and (3) the inability of a great many rural people to pay for medical care. During very recent years a new consciousness of the need for hospitalization and medical attention has developed, and large numbers of people have been more able to pay for these serv-

ices. This has placed a very acute strain on the numerically inadequate medical personnel and facilities.—Roy E. Hyde.

The Educational Status of Louisiana's Farm Population

Louisiana's farm people have received less formal educational training than those of any other state in the nation. White farmers as well as Negro have, on the average, completed less grades in school than have comparable groups in other states, and much higher proportions of them have never attended school at all. Although other residential groups in Louisiana likewise fall below the national average with respect to educational attainment, the unfavorable differential is most pronounced for the farm group.

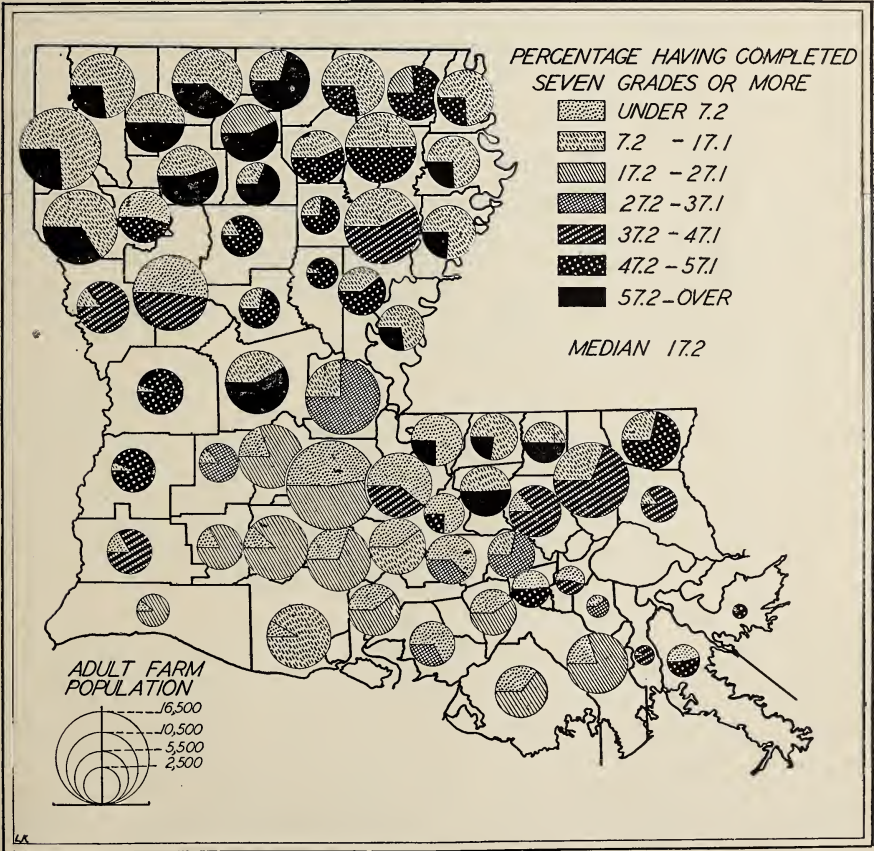


Figure 1. Amount of Formal Schooling Received by the Rural-Farm Population Aged 25 Years and Over, 1940, by Race and Parish. (Beginning at 9:00 o'clock and reading clockwise the segments of the circles represent the Negro and white populations, respectively.)

Within the state, as would be expected, the educational level of whites far exceeds that of Negroes. Persons of both races who live on farms have received less formal education than have city or village and suburban dwellers, and those who reside in the southern part of the state are, in general, equipped with less formal schooling than are those who live in the northern sections. Lincoln Parish leads the state in the educational status of the farm population; and most of its nearest rivals are clustered in the northwestern part of Louisiana. (See Figure 1).

—*Louise Kemp and T. Lynn Smith.*

Population Composition and Changes

The growth of the farm population in Louisiana is lagging far behind that of the state's towns and cities. Between 1930 and 1940 the rural-farm people increased only 2.8 per cent as compared with 18.7 per cent for the remainder of the population; and since 1940 we estimate that the people living on farms have decreased greatly, probably as much as 20 per cent. The unfavorable differential is true for both whites and Negroes, but is less extreme in Louisiana than in other parts of the nation and the South. Nevertheless, year after year the state's farm population is shrinking in its relative importance.

Within the state, the parishes making the most rapid gains in farm people during the decade ending in 1940 were situated in the sugar area, the Mississippi Delta area, and the rice area; the farm population in other parts of the state either declined or changed little. Furthermore, there is increasing tendency for the farm population to cluster in the areas immediately surrounding the towns and cities.

New urban nuclei are appearing in every part of the state; and those previously in existence continue their rapid growth. Fifty years ago there were only nine urban centers in Louisiana, while in 1940 there were 54. In recent years, New Orleans has not kept pace with the state's smaller urban centers; by 1940 the combined population of the other cities was equal to that of the metropolis. During World War II such cities as Lake Charles, Baton Rouge, and Alexandria mushroomed, largely at the expense of the surrounding farm areas.

Each 100 acres of cropland in Louisiana must support nearly three times as many people as is true in the nation as a whole. Louisiana's ratio of 18.5 farm people for every 100 acres of cropland compares very unfavorably with one of 7.6 in the United States, and 13.6 in eleven other southern states. Only in South Carolina, Kentucky, Virginia, Connecticut, North Carolina, and West Virginia must each acre of land support more farm people than in Louisiana. Within the state the pressure of population upon land resources is least intense in north central Louisiana and in the rice growing parishes of the southwest. It is the greatest in the sections producing strawberries and truck crops, and in some of the cutover areas such as La Salle, Vernon, and Beaure-

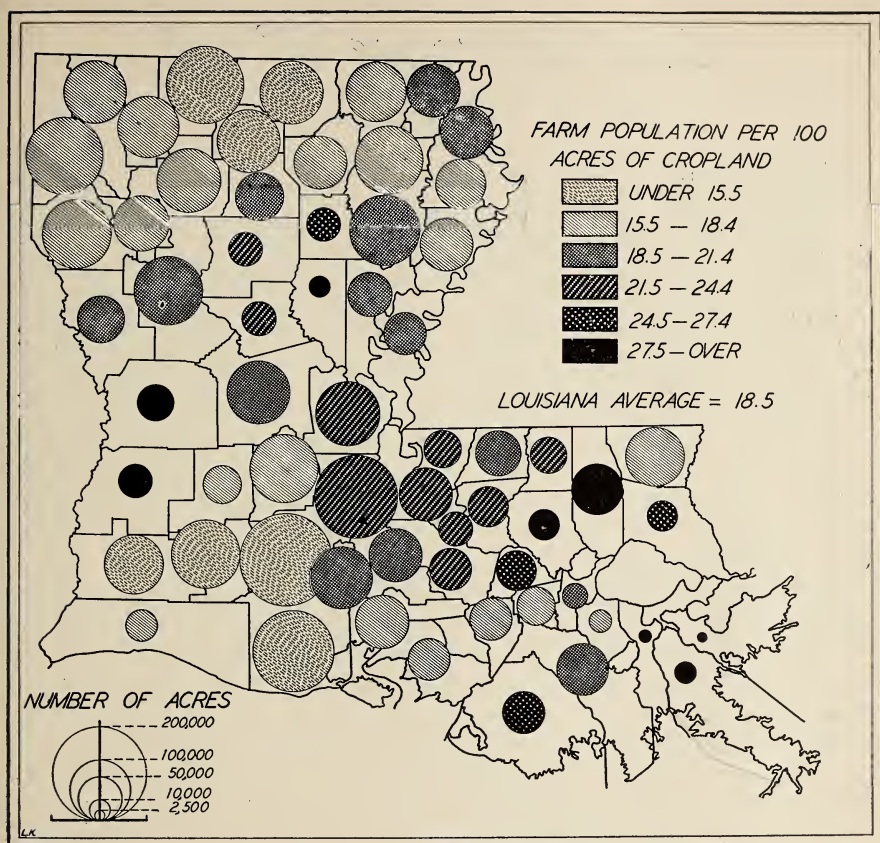


Figure 2. The Density of Farm Population in Louisiana, 1940, by Parishes.

gard parishes. It is also high in the dairy section to the north of Baton Rouge and in parts of the sugar bowl. (See Figure 2.)

If value of land and buildings, instead of acres of cropland, is used as the basis for comparison, Louisiana retains the same disadvantaged position in the nation and in the South; for every \$1,000 value in farm lands and buildings, Louisiana has 2.4 farm people as compared with 0.9 in the nation and 1.6 in eleven other southern states. In the state, the upland cotton area makes a relatively poor showing, whereas the southern parishes comprising the rice, sugar, and trucking areas as well as the parishes of the Mississippi Delta are better off. The parishes which contain urban centers make a better showing than those that are strictly rural.—*T. Lynn Smith and Homer L. Hitt.*

Seed Increase Work

* * *

Hybrid Corn

The demand for seed of adapted strains of hybrids is far greater than the supply. In 1945 seed producers in Louisiana planted 824 acres in double-cross production plots. However, owing to backwater and other losses, only 769 acres were harvested. From this acreage in production plots, approximately 8,500 bushels of cleaned seed of Louisiana hybrids were placed on the market in 1946. This amount of seed will plant only 15 to 20 per cent of the total corn acreage in Louisiana for 1946.

The main "bottleneck" in producing hybrid corn seed is the production of single-cross seed. In 1945 there were 50 acres planted to single-crosses. From this acreage enough seed was produced to plant 1,000 acres in double-crossing plots in 1946. This means we are averaging only 120 pounds of seed per acre on the single-crossing plots.

In 1946 there will be 80 acres in single-crossing plots. Even though this is more than a 50 per cent increase over 1946, it will not produce enough foundation single-cross seed for 1947 double-crossing plots.

In 1945 seed was produced for Louisiana white hybrids 468, 518 and 3802. In addition to this, seed was produced for Louisiana hybrid 1031, a white-capped, yellow-grained corn, and Louisiana hybrid 2909, a yellow flint-type hybrid. All of these hybrids will again be produced in 1946, except Louisiana hybrid 3802. The susceptibility of this strain to weevil damage does not warrant continued production, even though it is an extremely high yielding strain.

In addition to the above listed strains, there will be production plots for Louisiana white hybrid 502; Louisiana hybrid 1030 and a new pure yellow dent-type hybrid which has been designated as Louisiana hybrid 731.—*J. B. Holley.*

Vegetable Crops

The specialist's work (in 1945) was largely devoted to increasing, by Louisiana growers, new varieties of vegetables bred by the Agricultural Experiment Station of the Louisiana State University.

Growers were assisted in producing and selling seed and plants as shown in the table on page 101.

A total of 381,487 pounds of improved seed, 620,000 plants, and 6,300 bushels of potatoes valued at \$73,529 were produced by 42 Louisiana growers and the Louisiana State Penitentiary under the specialist's supervision.

<i>Item</i>	<i>Quantity</i>	<i>Unit Price</i>	<i>Value</i>
Collards (La. Sweet)	3,200 lbs.	\$.30	\$ 960.00
Corn (La. Bayou)	3,900 lbs.	.20	780.00
Corn (U.S.D.A. 34)	20,100 lbs.	.20	4,020.00
Okra (Green Velvet)	50,000 lbs.	.20	10,000.00
Okra (La. Market)	200 lbs.	.30	60.00
Cabbage (Allyear)	250 lbs.	2.00	500.00
Onion (C-5 Creole)	3,600 lbs.	3.00	10,800.00
Shallots (La. Pearl)	300,000 lbs.	.07	21,000.00
Watermelon (Dixie Queen)	200 lbs.	1.00	200.00
Strawberry plants (Konvoy, Klonmore, and Klondyke)	220,000 plants	10.00 per M	2,200.00
Onion Plants (C-5 Creole)	400,000 plants	1.50 per M	600.00
Sweet potato (Unit 1)	5,800 bu.	3.50	20,300.00
Sweet potato (Queen Mary and other seedlings)	500 bu.	4.00	2,000.00
Pepper (Dixie Wonder)	12 lbs.	7.00	84.00
Pumpkin (Longfellow)	25 lbs	1.00	25.00

Sufficient quantities of Louisiana Spineless Green Velvet okra, C-5 Strain of the Creole onion, and Louisiana Pearl shallots were produced by Louisiana farmers to supply the demand from Louisiana seed dealers and other customers for the first time since their introduction.

—*Joseph Montelaro.*

Sugar Cane

* * *

Test Field Work

During the season of 1945, the outfield sugar cane variety work of the Experiment Station was conducted at the following eight locations in the cane belt of the state: Cinclare, Napoleonville, Reserve, Bunkie, Meeker, Franklin, Broussard and Youngsville. There was a total of twenty-three experimental fields, averaging approximately two acres in size. A total of thirty-eight varieties, consisting of eleven commercial canes and twenty-seven unreleased varieties, was under cultivation during the past season.

The Experiment Station test fields were worked by the cooperators under their regular field system practiced in the commercial production of sugar cane for sugar. There was no special attention given to these fields, which were accorded the same treatment as fields under commercial production. All of the important procedures in connection with the work, such as, planting of varieties, harvesting, weighing and big-mill testing, sampling and small-mill testing of varieties, were all under careful supervision.

Final results of test field work were obtained during the regular Louisiana sugar cane harvesting and milling season. A mimeographed report, "Sugar Cane Test Fields—Season of 1945," which has been prepared, gives complete data and information on sugar cane outfields for 1945.

Test Field Plantings

In the early fall period of 1945, a total of nine fields was planted at the eight Experiment Station test field locations, from September 17 to October 12. This phase of the work included the following plantings:

(1) Main plot tests:

(Cinclare, Glenwood and Reserve) Yazoo soil: C.P. Nos. 29-120, 29-320, 34-120, 36-13, 36-105, 36-183, F. 36-819; C.P. 37-5 (Glenwood); F. 36-671 (Glenwood and Reserve).

(Cinclare) Sharkey soil: C.P. Nos. 29-116, 33-224, 34-21, 34-120, 34-139, 36-13, 36-105, and 36-191 and F. 36-671.

(Caffery) Franklin soil: Co. 290, C.P. Nos. 29-116, 34-120, 36-13, 36-105 and 36-183, F. 36-671 and F. 36-819.

(Billeaud and Youngsville) Lintonia and Olivier soils: Co. 290, C.P. Nos. 29-116, 33-243, 33-310, 34-120, 36-13, 36-105, 36-183 and 36-191, F. 31-762, F. 36-671 and F. 36-819.

(Shirley and Meeker) Yahola soil: C.P. Nos. 29-320, 33-243, 34-120, 36-13, 36-19, 36-105, 36-183, 36-197, 37-5, and F. 36-671 and F. 36-819.

(2) *Introductory varieties:*

Small lots of seed cane of seven new Canal Point seedlings grown at the L. S. U. Sugar Experiment Station were taken by trucks furnished by our cooperators, and planted at the eight test fields. The following varieties were planted on a small plot basis: C.P. Nos. 43-3, 43-9, 43-28, 43-32, 43-33, 43-47 and 43-49.

(3) *Increases of the promising C.P. 36-13 variety:*

Our test field cooperators, showing the usual interest in the propagation of new varieties, made the following early fall plantings of the promising C.P. 36-13 seedling cane, consisting of a total of twenty acres: Cinclare, 1.5; Glenwood, 3.5; Reserve, 3.5; Caffery, 3.0; Shirley, 4.0; Meeker, 3.0 and Billeaud, 2.0.

Season of 1945

At the three Mississippi river alluvial section test fields, C.P. 34-120 showed higher sucrose content and outranked the newly released C.P. 36-105 variety four out of seven times. It also outranked C.P. 36-105 at the Meeker and Shirley test fields and was definitely higher from a sucrose standpoint. In the Teche and western areas, C.P. 34-120 outranked C.P. 36-105 in five out of six tests.

In a total of fifteen tests at the eight test fields, C.P. 36-13 surpassed C.P. 34-120 three times and was higher in sucrose content seven times.

Two unreleased varieties, C.P. 33-224 and C.P. 34-21, made an excellent showing on Sharkey soil at the Cinclare test field.

In the Red river area, C.P. 34-120, C.P. 29-320 and C.P. 33-425 were the three leading varieties.

In the western area, C.P. 33-310 continued to show earlier maturing qualities, and outranked Co. 290 and C.P. 29-116 in the average results of fall plant cane and first stubble.

C.P. 37-5, an unreleased variety, showed good performance at the Reserve test field. C.P. 36-183, another unreleased variety, made a very favorable showing at the Reserve, Shirley, Caffery and Sterling test fields. This cane has proved to be quite subject to lodging and is not adaptable to mechanical harvesters.

Of the new varieties, in the introductory fall plant cane, the results indicate that F. 36-671, F. 36-819 and C.P. Nos. 36-178, 36-197 and 36-203 are showing some promise in comparison with the standard commercial canes. Additional data and information are to be obtained in 1946.

—C. B. Gouaux.

Varieties

The variety C.P. 36-105 discussed in the last annual report was released for commercial cultivation during the fall of 1945. Sucrose analyses and indicated yields of sugar per ton of cane have compared favorably with those obtained from Co. 281 and C.P. 34-120. Tonnage yields per acre have been high, but have been, on the average, slightly under those

obtained from C.P. 34-120, which is now established as a major field variety. The good yielding and satisfactory sucrose qualities possessed by C.P. 36-105 combined with the high degree of resistance to stubble failure, which is associated with prolonged standing of sugar cane during the latter portion of the grinding season after such sugar cane has been killed by cold weather, is a very important and valuable trait. C.P. 36-105 has proved superior to C.P. 34-120 in this respect and so can supplement C.P. 34-120 during this dangerous period of sugar cane harvesting.

C.P. 36-105 should prove widely adapted as an excellent midseason to late season variety particularly in the lower and middle sections of the sugar district; however, in the northern (Red River) section, sucrose analyses may not be high enough to justify extensive plantings; and in the western area, where Co. 290, C.P. 29-116, and C.P. 33-310 are the main field sugar canes, trial plantings and not extensive plantings are indicated.

C.P. 36-13 continues to show promise of commercial value and we expect that this variety will be released for commercial planting this fall for those soil types and areas of the sugar district where test field results are satisfactory.

C.P. 36-19 and C.P. 36-183 both continue to show commercial promise and are being increased. Neither C.P. 36-19 nor C.P. 36-183 is outstanding enough to justify expectation of becoming a major field variety, but each may find a place in the sugar cane variety program.

In the fall of 1945, seven new varieties were introduced onto the eight Experiment Station Test Fields and on our Primary Increase Station on Smithfield Plantation.—*E. C. Simon and F. W. Berthelot, Jr.*

Veterinary Science

* * *

Johne's Disease in Cattle

Johne's disease is a chronic infectious disease affecting the lining of the intestinal wall of cattle, sheep, goats, and the deer. The gut wall becomes much thickened and is thrown up in rolls giving the appearance of a washboard when it is opened. The disease is most prevalent in intensively cultivated districts, especially where dairy cattle are kept in close association with each other.

This experimental work is being done to try to find a specific and reliable diagnostic agent for this disease, to determine the length of time necessary to wait between tests when retesting a herd, and also to study the damage and destruction done in the animal's body by the germ.

Five naturally infected and one non-infected (control animal) yearling heifers were used for five months on experimental sensitivity tests. Four complete tests were made on the mature cattle in two dairy herds with johnin and mammalian tuberculin. Forty-eight and 72 hours after injections, millimeter increases in skin thickness were recorded on test sites. Two complete tests were made on the calves and yearlings in the same herd. The caudal fold was used continuously and in addition, a different area on the neck was injected at each test. This new (unused) area acted as a control to the normal sensitivity of the animal to the intradermic test. From the results it would seem advisable to wait longer than one month if the same testing site is to be used for the purpose of a retest for this disease.

All animals showing clinical symptoms of Johne's disease are confined to isolated experimental plots in order that the premises, including soil, sheds, water troughs, etc., may be thoroughly contaminated with the germ that causes the disease. These contaminated pasture plots will be used in future experiments to determine the length of time cattle will have to be withheld from them before they are safe to graze again. It seems this is necessary before any recommendations can be made on cleaning up an infected herd of cattle and their surroundings.

All clinical cases appearing in the experimental herds were autopsied in the latter stages of the disease. Microscopic examinations were made of scrapings of the lymph glands and intestinal tract to study the invasive power and distribution in the animal's body of the germ causing the disease. In all instances these animals have shown the typical gross pathology of the disease, and the causative agent has been demonstrated.

—Dennis Sikes.

Anaplasmosis in Cattle

Experimental findings reveal that the severity with which clinical anaplasmosis will affect individual cattle cannot be predetermined. It may be very mild and occur without knowledge of the owner or may be extremely severe and fatal. Fifty experimentally produced cases resulted in 45 to 50 per cent fatalities, and 50 to 55 per cent recoveries from clinical attacks of the disease. Because of this high percentage recovery and many apparently successful attempts at treatment of all types of cases, various medicinal agents have frequently been suggested as beneficial in treatment. Under experimentation, none which has been adequately tested has proved to have specific action on the causative agent of anaplasmosis. Whenever a practical treatment procedure is found and its merits proved, it will be made available through the veterinary profession.

The amount of infective blood required to produce anaplasmosis in susceptible cattle has been shown to be very small. Minute amounts of such blood injected into the skin of healthy cattle resulted in severe and fatal anaplasmosis. The severity was equal to that caused by much larger amounts of infective blood injected beneath the skin. This emphasizes the role which can be played by such agents as blood-sucking flies as transmitting factors. Anaplasmosis outbreaks in many sections are most prevalent and of greatest economic significance during seasons of highest fly populations. Also indicated is the role which man can play in unknowingly transmitting the disease through careless dehorning, vaccination, castration and other minor surgical procedures. The necessity of using clean, sterilized instruments for each operation cannot be stressed too greatly in areas such as Louisiana where cattle are frequently present in herds as unrecognized carriers of anaplasmosis.

Certain disease producing agents have been found to grow on egg embryos, and this fact has been put to much practical use in recent years. The adaptability of the causative agent of anaplasmosis has been similarly studied during the year. Under this procedure the causative agent could not be grown. Attempts at test tube culturing have also been continued in various ways, but results have not been encouraging in trials to grow this causative agent other than in the blood stream of cattle.—*P. L. Piercy and Eva S. Krug.*

Gastro-Intestinal Nematode Parasites of Cattle

Calves have been found to be much more severely affected by the nodular worm than by the stomach worm in carefully controlled experiments. Very severe symptoms have been produced and death has occurred in pure infections with the nodular worm, while it has been possible to produce symptoms of parasitosis in but one animal with the stomach worm. It has been found also that symptoms of parasitosis develop

during the larval period of the parasite rather than during the adult stage. Animals may begin to show the effects of the infection in from 5 days to 3 weeks after receiving the nodular worm larvae, while the adult stage is reached after 35 to 40 days. Animals show the effects of the infection by refusing to eat and drink, and in failure to gain weight, in light infection; and by a rapid loss of weight in heavy infections. In most cases there is a very severe diarrhea with a very bad odor and sometimes containing blood and blood clots. Animals begin to show improvement in general condition and to gain weight with the maturing of the larvae, as indicated by the appearance of parasite eggs in the manure, although they stay in poor condition and their weights remain below normal for months afterward.

Within from 1 to 4 months animals develop an immunity to the adult worms, and that they are eliminated is indicated by a rapid decrease in the number of eggs present in the manure and by the relatively few adults recovered at postmortem. Upon reinoculation further symptoms fail to appear and the number of parasites fails to increase, indicating the development of a resistance to the reinfection. This immunity, according to our observations, is permanent and lasts throughout the life of the animal. These observations indicate that the use of treatment for the removal of the adult parasites is of less value as a means of bringing about the recovery of affected calves than is generally believed. Treatment is more beneficial as a means of protecting unaffected and particularly non-immune animals by reducing the egg output of those calves harboring large numbers of adult worms. Owners should also realize the importance of such preventive measures as pasture rotation and clean barns as a means of eliminating the sources of infective larvae. Barn sanitation should not be neglected, since it has been found that infection of some species may occur through the skin and calves may lick the larvae from the hair after lying on contaminated floors and soil under shade trees.—Roy L. Mayhew.

Crotalaria Spectabilis Poisoning in Louisiana Livestock

Losses from *Crotalaria spectabilis* were investigated in one parish and were found to occur in animal species other than cattle and chickens, which were reported last year. The others include horses, mules, sheep and swine, according to available history and limited autopsy examinations. Information relative to the poisonous quality of *C. spectabilis* has been disseminated through the following media:

Circular 36—Livestock Poisoning by *Crotalaria Spectabilis*, October, 1945, P. L. Piercy and L. L. Rusoff, Louisiana Agricultural Experiment Station.

Paper—Monocrotaline, the alkaloid of *Crotalaria spectabilis* Roth responsible for death of Louisiana livestock and poultry, presented at

the Baton Rouge Regional meeting of the American Chemical Society, October 26, 1945. Illustrated by kodachrome slides.

Abstract—above paper—Proceedings of the Baton Rouge Regional meeting of the American Chemical Society held October 26-27, 1945.

Paper—*Crotalaria spectabilis* poisoning in Louisiana Livestock, P. L. Piercy and L. L. Rusoff. Jour. American Veterinary Medical Association, February, 1946. 4 Kodachrome figures.

—P. L. Piercy and L. L. Rusoff.

Experimental "Pinkeye" Treatment in Cattle

Comparative observations on four experimental treatment procedures applied in efforts to control "Pinkeye" in 194 studies have been made in University cattle. Four agents developed in recent years were tried in these studies—sulfanilamide, sulfathiazole, tyrothricin and penicillin, respectively. Limited laboratory studies were made as time and facilities permitted in correlation with treatment administrations in efforts to associate the occurrence of the condition with a specific causative agent.

Low treatment efficiency, the need for repeated treatment with unpredictable frequency, and the long duration of many cases in spite of treatment are all factors which identify the procedures employed as impractical in "pinkeye" control under range and many farm conditions. In some instances the ineffectiveness of treatment was marked by increasing severity of the condition with the eventual formation of an ulcer. At that stage it became necessary to employ controlled cauterization, after which recovery was relatively rapid and complete. Isolation of a specific causative agent was not accomplished.

—P. L. Piercy, A. H. Groth and Eva S. Krug.

Substations

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Fruit and Truck Experiment Station, Hammond
W. F. Wilson, Jr., Superintendent

Strawberry Studies

Variety Test

As part of the breeding program with strawberries carried on with Dr. J. C. Miller, the seedlings selected by observation of a few plants the first season are increased and planted in regular variety or yield tests with the standard varieties for this area.

For a seven-year period the disease resistant new variety Klonmore has produced an average yield of 193 crates per acre in comparison with an average of 191 crates per acre from the variety Klondike.

The new variety Konvoy produces larger yields than either of the varieties mentioned but lacks the shipping quality necessary for commercial production. This variety is recommended for home gardens and local markets.

The seedling L-39, to be introduced as "Marion Bell," has a very attractive fruit and produced yields this season comparable to those of the standard varieties, with a very high per cent of the total crop produced during the first half of the season.

Effect of Lime on the Production of Strawberries

Applications of dolomitic limestone at the rates of 1,000, 3,000, and 5,000 pounds per acre were made prior to the 1937 crop, establishing areas with a range in acidity from pH 4.4 on the normal areas to a pH 6.2 on the heavily limed areas. Acidity tests during the 1942 season showed for these areas a range from pH 4.3 on the normal areas to pH 5.0 on the heavily limed areas. Average yields from these areas during the eight-year period 1937 through 1944 showed consistent increases with the application of lime. The heavily limed areas produced an average of 221 crates per acre in comparison with an average yield of 180 crates per acre from the normal areas.

For the 1945 season additional lime was applied to the heavily limed plots and plants produced on unlimed and limed areas were set for comparison on both the normal and limed areas. The yield of berries on limed areas was greater than on the unlimed, or normal, plots. However, there was no difference in yields on limed areas that was due to the conditions under which the plants were originally produced; in other words, plants originally produced on unlimed areas gave just as great yields as plants produced on limed plots, when both were set to limed.

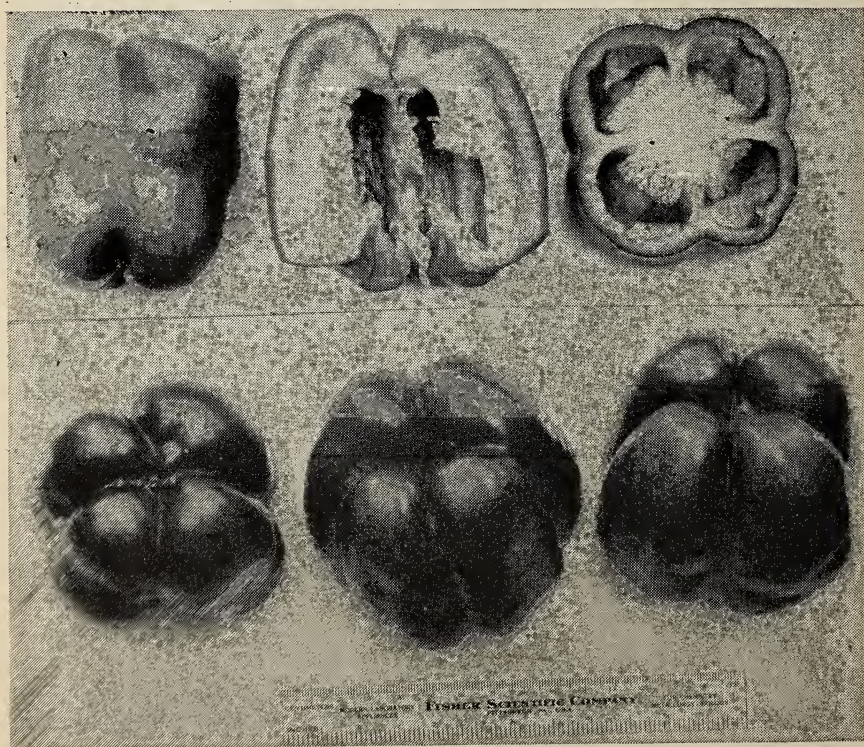
areas for production of berries. In the production of berries on unlimed, or normal, areas, which were extremely acid, plants that had been produced originally on limed areas showed an average of seven crates per acre increase over plants grown originally on unlimed areas.

Fertilizer Application

Owing to the widespread practice of applying all or a part of the fertilizer for the strawberry crops as a top-dressing at the time of scraping and mulching, a test involving variations of this practice was established this season.

The recommended formula and rate of 1,500 pounds per acre of a 4-12-4 fertilizer was applied under the crop, and a top-dressing, also using varying combinations of the two treatments, was used.

A single season's results show the largest yields from applying all of the fertilizer under the crop prior to setting the plants to the field.



Typical Fruits of the Dixie Wonder Pepper, Showing Thickness of Side Wall and Interior

Pepper Breeding

Last year's report gave a brief description of a new strain of pepper, Dixie Wonder, developed for South Louisiana. Owing to unfavorable conditions, adequate seed stocks were not produced this year and as the introduction and general planting of the variety is not possible until next season, attention is again called to the more valuable characters and behavior of the variety.

This season California Wonder, the standard variety for this area, produced a total yield of 259 bushels per acre in comparison with a yield of 345 bushels per acre by Dixie Wonder.

The Dixie Wonder was placed with a limited number of growers who tested it under field conditions. The new variety proved very productive and produced peppers of a very desirable market type.



Plant and Fruit of Dixie Wonder Pepper

Okra Breeding

The new variety Louisiana Market, developed to meet the needs of the commercial market, was grown by a few growers this past season with excellent yields of a high quality pod meeting the requirements of the markets.

Adequate supplies of seed will be available for the coming season.

North Louisiana Experiment Station, Calhoun
Dawson M. Johns, Superintendent

Agronomy

Corn Varieties and Hybrids

The commonly grown open-pollinated varieties were grown in a yield test with a large number of Louisiana Hybrids. The average yield of the six highest producing Louisiana Hybrids was 9.1 bushels per acre, or 14.7 per cent, more than that of the six open-pollinated varieties included in the test. The Louisiana Hybrids were as good as the open-pollinated varieties in quality and in resistance to diseases, insects, and lodging. Louisiana Hybrids 468, 3802, 502, 518, 520 and 1030 are highly recommended.

Louisiana Hybrids were compared in a yield test with hybrid strains developed by private and commercial breeders. The Louisiana Hybrids produced higher yields and better quality than any other hybrids included in the test. Tests along this line will be continued.

Corn Fertilizers

The results of experiments and field experience at the North Louisiana Experiment Station show clearly that proper fertilization of corn is essential if the crop is to be grown economically in the hill areas of North Louisiana. Yields ranging between 10 to 20 bushels per acre are produced where no fertilizer or inadequate fertilizer is used. Corn properly fertilized and cultivated produces 30 to 40, and often as much as 60, bushels per acre. The production of corn has been increased 20 to 30 bushels per acre with the use of \$8.00 to \$10.00 worth of fertilizer per acre. Proper fertilization of corn increases yields, improves quality, reduces the number of cultivations required and lowers the per-bushel cost of production.

Cooperative corn fertilizer demonstrations based on the recommendation of 375 pounds per acre of an 8-8-8 fertilizer before planting and a side-dressing with 100 pounds per acre of a 16 per cent nitrogen material were conducted on a large number of farms by the county agents of the Agricultural Extension Service in North Louisiana, and the following summary is reported by R. A. Wasson, Extension Agronomist:

"The purpose of these demonstrations was to show the advantages of using recommended fertilizer materials as to grade and quantity over fertilizer practices commonly used on farms for corn.

Total number of demonstrations.....	108
Average yield all demonstrations.....	48.1 bu. per acre
Average yield all checks.....	32.5 bu. per acre
Average increase all demonstrations.....	15.6 bu. per acre
Per cent increase over checks all demonstrations.....	48

"Conclusions:

1. A high grade complete fertilizer under cover, as a starter, gives profitable increases in yields.
2. It not only pays to fertilize corn, but it is much more profitable to use the right grade and quantity.
3. In a normal growing season there is not an important difference in yields on hill, bluff and alluvial soils if sufficient plant food is provided.
4. It requires about two pounds of available nitrogen under average farm conditions for each bushel increase in yield.
5. The state average yield of corn can be materially increased by proper fertilization."

Corn Spacing

A corn spacing test was conducted to determine the influence of spacing on the production of a high-yielding Louisiana Hybrid. The Louisiana Hybrid 468 was grown in 42-inch rows with single-stalk hills spaced 18, 24 and 30 inches apart. An application of 1,250 pounds per acre of an 8-8-8 fertilizer was made before planting so that ample plant food would be available throughout the growing season. The yields produced by the different spacings were 66.2, 65.1 and 65.8 bushels per acre, respectively. The test will be continued.

Grain Sorghum

Variety Test: A yield test comparing Early Hegari, Martin, Plainman and Caprock was conducted. The planting was made June 19 following an application of 100 pounds of nitrate of soda per acre. The test received two shallow cultivations, the second being preceded by a side-dressing application of 150 pounds of nitrate of soda per acre. The test was harvested September 19. Early Hegari and Martin produced the highest yields in the order named. Martin is a dwarf variety and is recommended over Early Hegari because it may be harvested with a combine.

Spacing: A field planting of grain sorghum was made with an ordinary one-mule planter plate with 12 holes $\frac{1}{4}$ inch in diameter. After germination the drill was solid with plants and a portion of the field was thinned or spaced, leaving small bunches of plants at hoe-width apart in the drill. Individual yield samples were taken from the spaced

and drilled portions of the field, and the yield was found to be more than 30 per cent higher on the drilled portion of the field, i.e., the portion unthinned with a hoe.

Cotton Varieties

Variety and new strains tests were conducted as in previous years. The weather was unfavorable for cotton, being cool and damp during the germination and early seedling periods and rainy at fruiting time, which resulted in most of the varieties producing yields and acre values somewhat out of line with those of previous years. Because of these adverse conditions, the varietal recommendations given last year should be continued, i.e., Miller, Stoneville 2B and Deltapine being recommended on wilt-free soils and Dixie Triumph and Coker's WR-5 where wilt is a problem.

Field blocks of a large number of new strains from the breeding plots were grown and several new strains appeared promising. Further tests and field plantings will be made next year and seed of two or three of the best appearing strains will be produced for limited distribution to farmers.

Cotton Fertilizers

Cooperative cotton fertilizer demonstrations based on the recommendation of 500 pounds per acre of an 8-8-8 mixture before planting were conducted on a large number of farms by the county agents of the Agricultural Extension Service in North Louisiana, and the following summary is reported by R. A. Wasson, Extension Agronomist:

"The purpose of these demonstrations was to show the advantages of using recommended fertilizer materials as to grade and quantity over fertilizer practices commonly used on farms for cotton.

Total number of demonstrations	83	
Average yield seed cotton all demonstrations.....	1,248	lbs. per acre
Average yield all checks.....	829	lbs. per acre
Average increase all demonstrations.....	419	lbs. per acre
Per cent increase over checks.....	50.5	

"Conclusions:

1. Cotton yields can be increased up to 60 per cent, even in an unfavorable season, by using the right grade and quantity of fertilizer.
2. Where ample plant food is provided, there is no essential difference in yields on hill, terrace and alluvial soils."

Sudan Grass

A variety test of Sudan grass was planted June 18 in rows 21 inches apart and cultivated one time. The test was given a side-dressing application of 200 pounds of nitrate of soda per acre. Three clippings were made during the growing season to determine the relative forage

yielding ability of each variety. The test included Tift, Regular, and Sweet, and produced 11,186, 11,093 and 9,644 pounds of green forage per acre, respectively. The "leaf spot" disease did not develop on any of the varieties. Tift and Sweet are reported to be resistant to the disease.—*Dawson M. Johns.*

Horticulture¹

Watermelon Breeding

The watermelon breeding program for the purpose of developing suitable varieties resistant to wilt was continued through the 1945 season. The wilt organisms are rapidly spreading throughout the sandy areas of Louisiana and some farmers reported a 75 per cent mortality rate from this disease the past season.

Considerable progress has been made in the breeding program and a suitable wilt-resistant melon should be released in a few years.

Edible Cowpea Breeding

A large portion of the sandy land areas of Louisiana is infested with the root knot nematode and with wilt producing organisms. Each year these organisms are spreading into other areas causing a great reduction in yields in areas grown continuously in cowpeas.

A breeding program is being continued with the objective of producing edible strains of cowpeas resistant to these diseases. Considerable progress has been made toward producing disease resistant strains of edible cowpeas.

Tomato Variety and Seedling Test

Tomato variety and seedling tests are conducted in connection with the tomato breeding program at the University Experiment Station. Although conditions existing at the beginning of the growing season weren't too favorable, high yields were recorded, with the seedling Dixie x Louisiana Gulf State ranking first and Marglobe second.

Sweet Potato Fertilizers

The results of the sweet potato fertilizer tests conducted in five North Louisiana parishes show very conclusively that sweet potatoes cannot be grown successfully in the hill areas of North Louisiana without the application of a high-grade fertilizer such as 400 to 600 pounds of 4-12-8, which gave highest yields in the fertilizer test during 1945.

Sweet potatoes grown without the application of fertilizers produced an average yield of 60 to 80 bushels per acre, while an addition of 400 to 600 pounds of a high-grade fertilizer per acre gave yields of 150 to 200 bushels of marketable roots per acre. Therefore, an expenditure of a

¹ Data obtained by P. L. Hawthorne.

few dollars per acre will increase the yields, on the average, 250 per cent and increase the monetary returns accordingly.

Sweet Potato Variety and Seedling Test

The sweet potato variety and seedling test is being conducted in cooperation with the sweet potato breeding program at the University Experiment Station to determine the varieties best adapted to the North Louisiana areas.

Of the edible varieties and seedlings, the Queen Mary and Unit I Porto Rico gave exceptionally high yields of marketable potatoes; however, the seedling L-138 produced as much as 50 bushels higher yield per acre in the 1945 test.

In the starch variety test the L-127 gave greater yields per acre than the Pelican Processor.

Peach Fertilizers

The results of the peach fertilizer test conducted during the 1941-1945 period show conclusively that a liberal amount of fertilizer must be applied in order to profitably produce peaches in North Louisiana. Proper fertilization increases the yield, improves the quality, lowers the cost per bushel, and increases the longevity of the orchard.

Most profitable yields were produced by the addition of 4-12-4 at the rate of 1 to 2 pounds per tree per year's age. The 4-12-4 was the only fertilizer used that contained the three major plant foods. Others used were 0-12-4, 4-0-4 and 4-12-0.—*Raymond E. Webb.*

Swine Production—Hogging Off Corn

Two acres of corn produced 59.4 bushels per acre, which was hogged off by 11 market barrows and one brood sow from August 27 until November 25, a period of 90 days. The yield of pork per acre was 888 pounds, which at 13 cents per pound would be equal to \$100.34 per acre gross return. The only additional feed given was $\frac{1}{2}$ pound of cottonseed meal per pig per day. The corn was Louisiana Hybrid 468 fertilized with 400 pounds of 8-8-8 fertilizer per acre plus 200 pounds of nitrate of soda. The market hogs made an average gain of 1.59 pounds per day.

One of the major problems in the cotton belt is that of replacing a percentage of cotton land with other types of farming. It would seem advisable to grow corn on part of this land if yields of 60 bushels per acre can be obtained. On the small cotton farm where it is desired to supplement cotton production with livestock it would seem that corn and hogs would fit into the farm program to good advantage. This experiment would indicate that hogs can be profitably fed off on upland corn.—*C. I. Bray, Dawson Johns, and J. L. Heath, Jr.*



Hogs and Corn Make Good Profits in North Louisiana

Dairy Herd Makes High Average Record

During 1945 the grade and purebred Jersey dairy herd (9.8 milk cows) averaged 8,312 pounds of milk which tested 4.6 per cent fat and averaged 280 pounds of butterfat per cow. Because of the shortage of labor it was necessary to practice close culling within the herd; therefore, the herd was smaller than heretofore. The milking cows of the herd now consist of six purebreds and four grades. In addition, there are seven heifers, five purebreds and two grades.

No silage was produced for the herd because of the labor shortage. However, this was partially offset by the feeding of alfalfa hay, which was produced on the experimental dairy portion of the station. The alfalfa tract proved better in its second year of production than in its first year. The use of improved permanent pasture plus oats for fall, winter, and spring and Sudan grass for late summer greatly assisted in maintaining the high production level attained.

—D. M. Seath and D. M. Johns.

Green Feed Important with Simple Rations for Hens

Satisfactory green feed crops can be maintained in the hill section of North Louisiana although more difficult to maintain than similar yards on the alluvial soils, as at Baton Rouge. Two yards per pen, each 50 feet by 50 feet in size, have provided adequate green feed at most seasons of the year for 30 hens and two male birds. Careful planning, adequate fertilizer and good seed are required to produce enough rye grass

(for winter pasture) for this number of hens in such small yards. If the season is poor, the supply will not be adequate. For this reason it is better to plan larger yards. The two yards are necessary so that the birds can be taken off the rye grass if they graze it too closely. The alternate yard makes rotation by seasons possible, e.g., to yard with bermuda grass and lespedeza during the summer-fall season. Chickens will make good use of pasture when given the opportunity. Winter pasture is especially important when simple rations are used.

The hens receiving a ration with cottonseed meal as the only source of protein laid exceptionally well this year. The average production for ten months was 156.9 eggs per hen—only one egg less than the birds receiving a “complex” (or multiple protein source) mash and nine eggs more than those in the soybean meal pen. The soybean meal pen usually has been relatively higher and the cottonseed meal pen lower than this year. At any rate, the results this year show definitely that hens fed cottonseed meal can and will lay well *when good green feed* is supplied. To avoid olive yolked eggs, 1 per cent ferrous sulphate is added to the cottonseed meal used in the mash.

To further demonstrate the value of green feed when the hens get an extremely simple ration, two pens are receiving mash composed of one-third cottonseed meal and two-thirds yellow corn meal. One of these pens gets no green feed except the grass that grows in the yards, while the other has rye grass for winter pasture. The results will be of interest to many farmers.

Again this year, the pen fed “free-choice” with 32 per cent protein-vitamin supplement and corn and oats consumed less protein, 13.5 per cent, than the other pens with approximately 15.5 per cent. Even with this lower protein consumption the average egg production was within six eggs of the best pen. The body weight of the hens in the 32 per cent supplement pen averaged higher than that of hens in other pens, particularly during the summer months.

—C. W. Upp, J. L. Heath, and D. M. Johns.

Turkeys Profitable in North Louisiana²

The first year in which turkeys were produced at the North Louisiana Station was quite successful. Four hundred and fifty turkey hatching eggs (broad breasted Bronze) were purchased from a Texas breeder and shipped to Monroe, where they were hatched on April 23 in a commercial hatchery. Three hundred and eight poults were hatched. They were divided equally and were brooded in two 10 feet by 12 feet brooder houses with wire-floored sun porches of the same size. Canopy type oil burning brooders were used. At nine weeks of age the poults

² O. E. Goff, B. A. Tower, and D. M. Johns worked a great deal on this project while C. W. Upp was away.

were divided into five groups (lots), three of which were grown out on pasture in range shelters. The other two lots were kept in the brooder houses throughout, i.e., grown in confinement.

Mortality

The mortality was 7.8 per cent for the first nine weeks, and the mortality and culling from day-old to 28 weeks of age was 14.3 per cent. This compared favorably with the 22.5 per cent loss recently released as the average loss of poults in the entire United States last year. The five-year average for the United States is 27.6 per cent. Of those lost from our flock, 10 per cent were accidentally killed, 35 per cent culled for such causes as breast blisters, pendulous crop and undersize, 20 per cent died because of the heat, and for 35 per cent the cause was undetermined.

Average Weights

The average weight of the females at 28 weeks of age was 16 pounds and of the males, 25.8 pounds.

The poults were all fed a commercial turkey starting feed for the first nine weeks. Three different rations were used thereafter, one with a complex mash with numerous ingredients, another a simple mash (few ingredients), and a third was a commercial or manufactured 32 per cent protein-vitamin supplement. All of the lots had access to corn and oats free-choice in addition to the mash. No great differences in final weights were obtained with the different rations. The heaviest males were in the lot on range with complex mash, the average weight being 26.6 pounds. The other lots averaged within .6 pounds of this except those grown in confinement with 32 per cent supplement, the average weight of which was 24.4 pounds. This is accounted for at least in part by the fact that insufficient grain feeders were provided in this pen. The females of this same lot were heavier than those in any other. The lightest females were those fed the simple ration on range, their average weight being 15.7 pounds. The females in the other pens averaged 16 pounds.

Feed Consumption and Margin Over Feed Cost

Very important questions in producers' minds are: (1) How much feed was required to grow the turkeys, and (2) what was the margin over feed cost? The average feed consumption per turkey in all lots was 118 pounds with an average weight of 20.8 pounds. This means that 5.7 pounds of feed were required to produce a pound of turkey. The feed cost per turkey averaged \$4.15, and the market value per turkey (at wholesale O. P. A. ceiling price) was \$6.90, or a margin over feed cost of \$2.75. Feed consumption was higher, 31.5 pounds per turkey, for the confined lots as compared to those on range. Feed wastage was somewhat greater in the confined pens but the main difference in feed consumption must be credited to the value of the pasture for the lots

grown on range. Largely because of the difference in feed consumption, the turkeys grown on range made a return of \$3.33 per bird over feed cost, while the return over feed cost for those grown in confinement averaged \$2.02 each.

Grading and Dressing

The turkeys were all graded alive and subsequently ten toms and ten hens from each pen were killed and dressed, and again graded as to finish. No great differences were found in the turkeys from the different pens. All of them graded quite high. The losses in weight due to dressing and drawing were recorded for the birds slaughtered. The chilled dressed weight of the males averaged 92.4 per cent of the live weight; for the females it was 92.7 per cent. The drawn weight, including giblets, averaged 80.8 per cent of the live weight for the males and 81.0 per cent for the females.—C. W. Upp and J. L. Heath.

Rice Experiment Station, Crowley¹

J. Mitchell Jenkins, Superintendent

Culture

Fertilizer Experiments

Included in the fertilizer experiments were: (1) A complete 8-10-6 fertilizer, with three sources of phosphorus applied at the rate of 400 pounds per acre; (2) Applications of straw with and without a complete 8-10-6 fertilizer applied at the rate of 400 pounds per acre; (3) Method of application and, (4) Effect of $1\frac{3}{4}$ tons of rice straw applied to the land in alternate years.

Sources of Phosphorus

This experiment was conducted with rice grown in alternate years on land rotating every four years with a like area that had been devoted to an improved pasture for four consecutive years. The same fertilizers that were applied to the rice crop also were applied in alternate years to the plots devoted to improved pasture. The beneficial effect from the improved pasture is indicated by the rather high 8-year average yield of 58.6 bushels per acre from the check plots.

The 8-year average (1937-1945 less 1940) yield of rice for T.V.A. treble superphosphate was 74.4 bushels; for T.V.A. fused phosphate, 74.0 bushels; and for bone meal, 70.4 bushels per acre. In the order

¹ Cooperative experiments with the Louisiana Agricultural Experiment Station and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture.

listed, the increase in yields as compared to the check plots was 15.8, 15.4, and 12.3 bushels per acre, respectively. These results indicate that the three sources of phosphorus were about equally good.

Effect of Straw with and without Fertilizer

The 7-year (1938-1945 less 1940) average increase in yield of rice grown in alternate years, following straw alone, was 5.8 bushels, and the 8-year (1937-1945 less 1940) average yield following straw plus a complete fertilizer, was 14.8 bushels per acre. The 8-year average yield of the check plots was 46.3 bushels per acre.

The 7-year (1938-1945 less 1940) average increase in yield of rice grown on land cropped *each* year following straw plus fertilizer, was 15.3 bushels per acre. The 7-year average yield of the check plots was 39.3 bushels per acre.

Effect of 1 $\frac{3}{4}$ Tons of Rice Straw Applied to the Land in Alternate Years

The straw was applied to the plots in the winter. In Treatment 1, the straw was allowed to remain undisturbed until plowed under the following fall in preparation for spring seeding; in Treatment 2, the straw was turned under after it was applied; and in Treatment 3, the straw was disked in but not plowed under in seedbed preparation. All plots, including the check, were fertilized with a 6-8-4 formula at the rate of 200 pounds per acre at seeding time. In 1945, the average yields were: Treatment 1, 72.5 bushels per acre; Treatment 2, 67.2 bushels; Treatment 3, 64.1 bushels; and for the check, 72.2 bushels per acre. The reduced yields in Treatments 2 and 3 are probably due to a shortage of nitrogen as a result of competition for this element between the rice plants and the organisms involved in the decomposition of the straw.

Method of Application

In 1945, the application of 200 pounds per acre of 8-10-6 fertilizer with the seed and 200 pounds 8 weeks after submergence produced 8.7 bushels more per acre than when the total amount, 400 pounds, was applied with the seed. In the 6-year period (1939-1945 less 1940), the average increase in yield for the split application was 7.6 bushels per acre more than when the total amount was applied with the seed. The average yield from the check plots during this period was 49.3 bushels per acre.

In 1945, the highest average rice yield, 32.4 bushels per acre, was from the plots to which the fertilizer was applied after draining the field. The plots that received the fertilizer on the water ranked second, with a yield of 32.1 bushels per acre. The average yield from the plots that were fertilized at the time of seeding was 26.7 bushels, or 3.1 bushels above the average yield of the check plots.

The highest 3-year (1943-1945) average yield of 33.6 bushels per acre was from the plots that were drained before the fertilizer was applied. The second highest yield of 31.0 bushels was from the plots to which the fertilizer was applied on the water. The 3-year average yield from the plots that were fertilized at the time of seeding was 26.9 bushels, or 1.6 bushels above the average yield of the check plots.

Rotation Experiments

Two-Year Rotation

In 1945, the highest average rice yields in eight 2-year rotations were: following clean summer fallow, 26.4 bushels; Barchet soybeans, 25.5 bushels; and following *Crotalaria spectabilis*, 24.5 bushels per acre.

The crops or treatment that alternated with rice and the 11-year (1934-1945 less 1940) average rice yields were as follows: Red clover on rice stubble, 44.6 bushels; Italian rye grass on rice stubble, 44.6 bushels; clean summer fallow, 44.1 bushels; Barchet soybeans followed in fall by Bur clover, 43.8 bushels; Barchet soybeans alone, 43.8 bushels; native pasture, 42.8 bushels; *Crotalaria spectabilis*, 42.7 bushels, and cotton dusted with calcium arsenate until 1941, replaced in 1942 by oats and Alyce clover, 32.9 bushels per acre.

Two-Year Rotation to Determine the Effect of Fertilizer on Rice Yields Following Lespedeza

In 1945, the yield of rice following lespedeza fertilized was 46.8 bushels and not fertilized, 40.3 bushels per acre. The 3-year (1943-1945) average yields for the fertilized and not fertilized plots were 32.6 and 27.8 bushels per acre, respectively.

On July 6, 1945, very good stands of volunteer lespedeza were noted in plots where rice was grown in 1944. This indicates that lespedeza under favorable conditions will reseed itself in alternate years with rice, provided it is seeded for two or three years and enough seed remains on the land and becomes widely distributed throughout the soil by subsequent plowings and seedbed preparations for rice.

Residual Effect of Calcium Arsenate on Rice Yields

In 1945, the average rice yield of 40.2 bushels per acre from plots that had not been dusted with calcium arsenate, was 5.6 bushels more than from plots that were dusted.

The 10-year (1935-1945 less 1940) average yield of 41.0 bushels of rice per acre from plots that had not been dusted with calcium arsenate was 9.6 bushels greater than the average yield from plots that had been dusted with calcium arsenate.

Rice Varietal Improvement²

Expansion of Program

Rice improvement work was expanded in 1944 and 1945 to include outfield testing of promising selections, and seed increase of new varieties. This was made possible by the assignment of a technical assistant to the project by the Director of the Louisiana Experiment Station. The crossing, selection, and testing program at the Rice Experiment Station has been discussed in previous reports. During the past two years outfield nursery yield tests were conducted; new varieties were grown on farms in one- or two-acre patches, and the first farm fields of new varieties were inspected. The cooperation of farmers and county agents has been an essential part of these new activities.

Ten Promising New Selections

The unnamed selections described below, which were selected from crosses made at the Rice Experiment Station, have reached the stage for final testing. Seed of these has been or will be increased to provide seed for release to farmers for growing under contract on small fields. Four selections or varieties were tested on fields in 1944 and 1945, but two of them have since been withdrawn because they were not wholly satisfactory. Seed of two other varieties, Kamrose and Culosa x Blue Rose, 2913A29-1, were supplied to farmers for trial, but these also failed to qualify as prospective standard varieties.

Early Selections

Selections, Number 6-250, from the cross 2913A5-1-3 (Colusa x Blue Rose) x AL11-1 (Shoemed x Fortuna), are vigorous, have smooth hulls, and differ somewhat in maturity, height, shattering, and grain size. The grain of these selections is somewhat shorter than that of Blue Rose and should be of excellent milling quality.

Midseason Selections

Selection, Number 6-251, from the cross 283A10-1-1-3 (Edith x Fortuna) x AL11-1, are similar to those of Number 6-250 and perhaps have more desirable grain types.

Selection Number 4-130, from the cross 283A3-6-2 (Edith x Fortuna) x C. I. 4440, is a medium-grain of good yielding capacity and it has shown some resistance to stem rot.

Selection Number 322A6-23, from the cross Rexoro x Fortuna, has a short straw, is easy to thresh, and matures about the same time as For-

² Cooperative experiments with the Louisiana Agricultural Experiment Station and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils and Engineering, Agricultural Research Administration, United States Department of Agriculture.

tuna. Shelling tests indicate that it should give a high yield of head rice for a long-grained variety. About two acres were grown by one farmer in 1945 and his report was very favorable.

Midseason to Late Selections

Selection Number 3-I-9-2-4, from the cross Blue Rose x Rexoro backcrossed to Blue Rose, is similar to Blue Rose in plant and grain type, is smooth-hulled, and matures about three days later than Blue Rose. It is very resistant to diseases.

Selection Number 6-I-25-12, from the cross Blue Rose x Rexoro backcrossed to Blue Rose, is a short stiff-strawed, smooth-hulled, easy threshing variety, about a week later than Blue Rose. It has an excellent medium grain, slightly smaller than that of Blue Rose, and it is very resistant to diseases.

Selection Number 3-72-3, from the cross Rexoro x Purple Leaf, is a vigorous, smooth-hulled, plump, long-grained type, similar to Rexoro in plant growth but earlier.

Selection Number 3-II-1-24, from the cross Blue Rose x Rexoro backcrossed to Rexoro, is a smooth-hulled type of about the same maturity as Rexoro. It shatters less readily than Rexoro and has an excellent, clear, long slender grain.

Several selections, Number " $\frac{7}{8}$ Rexoro," from the cross Blue Rose x Rexoro backcrossed twice to Rexoro, are very similar to Rexoro in plant and grain type. Several strains are available, some of which are earlier than Rexoro and also are resistant to the new race of *Cercospora oryzae* leaf spot disease to which Rexoro is susceptible.

Selection Number 3-I-2-25, from Blue Rose x Rexoro backcrossed to Blue Rose, has a very stiff straw, is easily threshed, and has a Blue Rose grain type, but it is later and matures at about the same time as Rexoro. About an acre of this selection was grown by a farmer in 1945.

—N. E. Jodon and D. J. Comeaux.

United States Department of Agriculture

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Bureau of Entomology and Plant Quarantine

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Search for Substitutes, Adjuvants, and Reduced Dosages for Rotenone and Pyrethrum for Control of Insects Attacking Cole Crops Shows Promise¹

The search for substitutes, adjuvants, and reduced dosages for rotenone and pyrethrum for controlling cabbage caterpillars and the turnip aphid was continued during 1945. Among the materials tested, DDT was given special attention because of its very promising results during 1943 and 1944.

In the spring experiments during 1945, on cabbage caterpillars, DDT dust mixtures at 1, 3 and 5 per cent strengths were compared with mixtures containing 0.75 per cent of rotenone and 10 per cent of sabadilla. Applications were made at approximately 20 pounds per acre at intervals of 7, 14, and 21 days from the time the infestation developed until harvest. The infestation was light and the 14- and 21-day applications of the 3 and 5 per cent DDT were effective, but not so effective as the 7-day applications. The sabadilla was relatively ineffective. The results were in line with those of previous tests in that the 3 and 5 per cent DDT dusts were more effective than 0.75 per cent rotenone dust.

In the fall experiments the 1 and 3 per cent DDT dusts were compared with undiluted cryolite and with a mixture containing 95 per cent of calcium arsenate and 5 per cent of Paris green. The applications were made at 10- and 14-day intervals from the time the first pair of true leaves appeared until the plants began to head. The plots were heavily infested with the cabbage looper and the fall armyworm, or "grass worm." None of the treatments gave satisfactory control. There was no indication that any of the treatments killed any of the fall armyworms, and the highest control of the cabbage looper was only 60 per cent. The unsatisfactory control may have been due to excessive rainfall during the period of application (which was begun August 6), to

¹ In cooperation with the Louisiana Agricultural Experiment Station and Louisiana State Department of Agriculture and Immigration.

high temperatures, to sunlight, to the caterpillar population, or to a combination of these conditions. The inadequate control with undiluted cryolite and the arsenicals makes the results questionable.

Spring and fall experiments were also conducted to find a substitute or reduced dosages for rotenone for the control of the turnip aphid. DDT, rotenone, sulfur, light mineral oil, and three forms of nicotine were used at about 20 pounds per acre at 10-day intervals until maturity of the crop.

The 5 per cent and 10 per cent DDT dust mixtures did not control the turnip aphid. One per cent of rotenone with 38 per cent of sulfur was the most effective treatment, and this was significantly better than 0.75 per cent of rotenone plus 38 per cent of sulfur, and 0.75 per cent of rotenone plus 2.0 per cent of oil, but was not superior to 0.5 per cent of rotenone plus 1.0 per cent of nicotine derived from a proprietary dry concentrate containing both nicotine sulfate and nicotine alkaloid. There was no significant difference in the results obtained with dust mixtures containing 2 per cent of nicotine derived from nicotine sulfate, nicotine alkaloid, or a mixture of the two.

The new insecticide benzene hexachloride was effective in preliminary tests against the green cabbage caterpillars and the turnip aphid, but caused slight injury to cabbage plants. Further work is being conducted with this material. Its chief drawback is its offensive lingering odor.

—K. L. Cockerham, O. T. Deen, and P. K. Harrison.

Sweet Potato Weevil Investigations²

During 1945 investigations on the sweet potato weevil were continued along lines similar to those in effect during the preceding year. Phases of the problem studied were (a) insecticides for use in the field and in storage, (b) herbicides for destroying vines before harvest, (c) new sweet potato varieties or crosses for weevil resistance, (d) the use of mechanical harvesters for cleaning fields of potatoes during the harvesting process, and (e) toxicity of chemicals in poison baits.

Owing to a very light weevil infestation, no additional data were obtained on insecticide control in the field, but DDT in residual form in storage houses, on stored potatoes, seed, and refuse dumps, was very promising. DDT in kerosene and benzene solutions and in kerosene emulsion, at 1, 3, and 5 per cent strengths, and in dust mixture at 10 per cent strength were very toxic to adults crawling over treated surfaces for several weeks after treatment. Approximately 1 pound of DDT was applied per 3,000 cubic feet of storage space. The 5 per cent strength in benzene, the most effective of these treatments, was toxic for 27 weeks. When the 10 per cent dust was applied to infested potatoes, all adults were killed after they crawled over the treated potatoes and crates.

² In cooperation with the Louisiana Agricultural Experiment Station and Louisiana State Department of Agriculture and Immigration.

Ammonium sulfamate and dinitro-o-sec-butylphenol were the best herbicides tried for killing sweet potato vines before the harvest, but 2,4-dichlorophenoxyacetic acid and the sodium salt of this material penetrated the roots better and caused more decay than the others. This indicates that the first two materials named may be suitable for killing sweet potato vines and the last two for eradicating volunteer sweet potato plants and wild host plants.

In a weevil-resistance test, using nine new sweet potato varieties or crosses, selection number 32-10-5 was less infested than the others, but further tests are necessary before any conclusions may be drawn.

In one small field test it was demonstrated that sweet potatoes may be successfully harvested with a mechanical harvester and that fields are left much cleaner than when they are harvested with a horse-drawn plow. The use of a mechanical harvester should reduce the winter carry-over of weevils in infested fields.

Twenty-five chemicals were tested in poisoned baits against weevil adults, and the most promising of these were also tested on plants. Paris green, sodium fluosilicate, and 2,4-dinitrophenol were the most toxic materials tested.

K. L. Cockerham, P. K. Harrison, and O. T. Deen.

Bee Culture Investigations

The Southern States Bee Culture Laboratory, a field station of the Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, United States Department of Agriculture, was established cooperatively with the Louisiana State University in 1928 and is concerned with beekeeping problems common to the Southern States.

Damage to Combs in Beehives

In addition to damage to combs by wax worms and mice, many combs are injured by the bees themselves. Three types of damage are common: (1) Irregular, curved areas are chewed from the lower corners of frames near the hive entrance; (2) the entire bottom of the comb is destroyed so that a space $\frac{1}{4}$ to $\frac{1}{2}$ inch wide is left above the bottom bar; and (3) irregular areas of worker cells are chewed to the midrib and replaced by drone cells, or less frequently rebuilt as worker cells. Any injury to combs decreases the area available for egg laying or for storage of nectar or pollen and, if combs are not firmly attached to the wooden frame at the bottom or ends, more damage results from handling of the combs by the beekeeper.

It has been found that gnawing of the lower corners of combs near the entrance is decreased if the entrance is darkened. A thin sheet of metal laid across the bottom board so that it extends 4 to 6 inches beneath the first hive body appears to be effective.

A shallow super of combs placed below the brood chambers helps to prevent damage from gnawing of corners or along the bottom bar of brood combs. The shallow supers are seldom used for storage of either nectar or pollen, except perhaps temporarily, and the queen seldom lays eggs in them. After a year of use the shallow combs are often reduced to irregular comb masses and evidently serve as clustering areas for field bees.

The third type of comb damage, in which sections of comb are removed to the midrib and then rebuilt, is not well understood. It resembles the work of bees in removing disease. Sometimes the same area may be reworked more than once. Since this type of damage seems to be most common in periods after the main honey flow, when large numbers of bees are idle, field bees clustered at night or idle bees after a flow may be responsible.—*Warren Whitcomb, Jr.*

Package-Bee Production Often Limited by Hive Space

In studies in cooperation with commercial shippers it was found that colony development is often limited by lack of room. A colony with adequate stores of honey and pollen, or supplied pollen cake, cannot reach maximum population in less than three full-depth hive bodies. In colonies confined to two deep bodies, maximum populations were approached only in those colonies with honey reserves so low that practically all comb space was available to the queen. Generally where honey and pollen reserves were adequate, colonies in two-story hives became crowded and began swarm preparations before the start of the shaking season. Provided the queen and stores are adequate, increased production of bees can be obtained by use of larger hives.

—*Warren Whitcomb, Jr.*

Queen Losses in Honey-Production Apiaries

For the last four years queen losses have been observed in an apiary used for production of honey. Each year these colonies have been requeened with sister queens all obtained from a single queen breeder. In 1942 out of 30 queens used, 22 failed during the season; in 1943 out of 30 queens, 24 were missing at the end of the season; and in 1944 and 1945, out of 40 queens each year, 15 and 17 failed by the end of the honey flow. Since very few queens failed during February and March, when colony development must be rapid if a spring crop is to be gathered, the effect of queen loss is not so serious as the numbers lost might indicate. However, if failing queens are not replaced promptly by normal supersedure or by requeening, crop losses can be expected.

—*Everett Oertel.*

Artificial Insemination of Queen Bees

The artificial insemination technique has been used with queen bees for several years. For the last two seasons inseminated queens have performed as well in honey-producing colonies as have naturally mated queens. However, there has been a delay of approximately 30 days between the time of insemination and the start of egg laying. During this period bees have treated the queen much as they would treat a virgin, and queen losses have been high. It has been found that anaesthetizing the queen with carbon dioxide during the two or three inseminations necessary to assure a full mating will cause her to start egg laying as soon as do naturally mated queens. Further studies are under way, but it is believed that artificial insemination of queens can now be used on a much wider scale than had been thought possible.

—Otto Mackensen.

Location of Colonies in the Apiary

For the last four years honey-producing colonies have been arranged in four parallel rows. Rows 1 and 2 face the east and rows 3 and 4 face the west. There are usually 8 colonies in each row. In this period row 1 has had the largest yield, row 3 has been second in yield and rows 2 and 4 have alternated in the third and fourth positions. It is, therefore, possible that position of the colony in the apiary may influence the size of the honey crop. Queen breeders or honey producers who select breeding stock on the basis of production should be certain that location of the colony in the apiary is not influencing their choice of breeding stock.—Everett Oertel.

Bureau of Plant Industry, Soils and Agricultural Engineering

Irish Potato Breeding

The work of the Federal Irish potato breeding program in the Southern States has advanced to the stage where seedlings possessing a considerable degree of resistance to scab and early blight have been found. However, none of the selections being tested has all the other characters desired, so that further breeding work is necessary in order to combine all of these characters in one seedling-variety.

Disease Resistance

A number of seedlings have been produced that possess a marked degree of resistance to scab. One of these seedlings, a white-skinned type, yielded as well as did Katahdin from Louisiana spring-grown seed. In addition it was about the same as Katahdin in cooking quality. Several seedlings were selected that were only slightly affected by early blight.

The above seedlings will form the basic material for further breeding in an effort to secure new seedlings possessing resistance to both scab and early blight as well as being of good yielding ability.

Adaptability of New Seedlings and Varieties

As in previous years, small lots of new seedlings were sent to most of the Southern States for further selection under local conditions. A white seedling that was highly resistant to late blight in Texas was a particularly heavy yielding sort in Texas. As soon as additional seed of this seedling and others can be grown in the North further yield tests will be made in Louisiana.

Teton, a newly released variety that is highly resistant to ring rot, has been found to be inferior to Katahdin in yield tests for two years at Baton Rouge, Louisiana. This is a white-skinned variety.

Menominee, a scab-resistant variety which has recently been named and released, was found to yield about as well as Katahdin last season at Baton Rouge, Louisiana. This is a white variety and late in maturity.



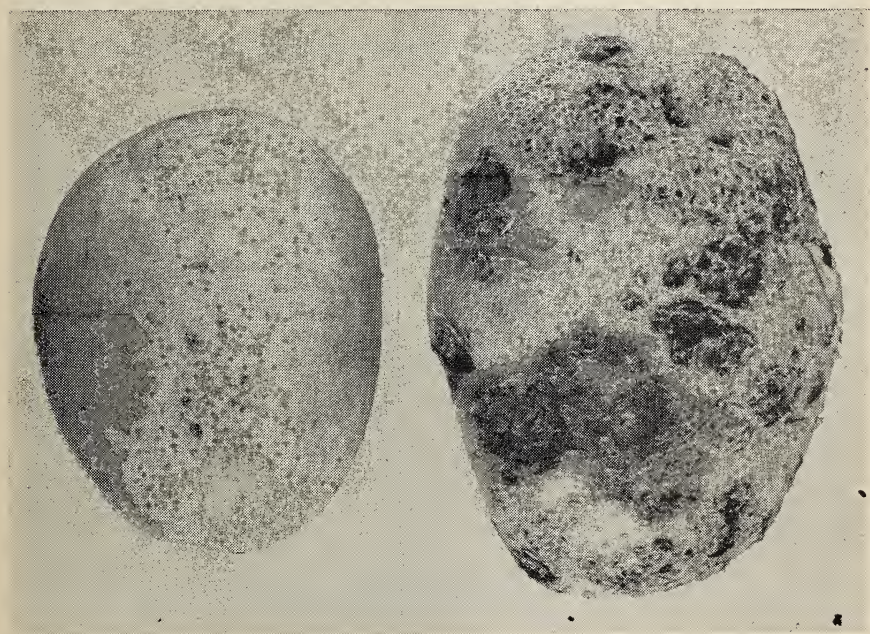
Leaf on left from one of many potato seedlings found to possess some resistance to early blight. Leaf on right from a very susceptible variety.

Locally Grown Katahdin as a Source of Seed

For several years a number of growers in Louisiana have been using home-grown Katahdin potatoes for seed the following year. From spring to spring the seed is kept in commercial cold storage. By so doing they have eliminated the necessity of purchasing new certified seed from the North each year.

A lot of Katahdin seed stock was located near Alexandria, Louisiana, that had been grown in Louisiana for 9 consecutive years without recourse to new seed. A test was made to determine the yielding ability of this seed as compared with new certified seed at Baton Rouge, Louisiana, last year. The 9-year-old seed yielded 201 bushels of No. 1 tubers in comparison with 309 bushels from the new certified Katahdin seed.

Additional tests should be made of locally grown seed before definite conclusions can be made, but from this test it appears that a marked reduction in yielding ability resulted from maintaining this seed stock so long in Louisiana.—*E. L. LeClerg.*



Tuber on left produced by a potato seedling that possessed a high degree of resistance to scab. Contrast this with the very susceptible variety represented by the tuber on the right.

Corn Hybrids

The corn breeding program at the Louisiana Agricultural Experiment Station is conducted in cooperation with the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils and Agricultural Engineering, Agricultural Research Administration, United States Department of Agriculture.

Corn hybrids developed in this program are adapted to Louisiana and continue to produce substantial increases in yield over the open-pollinated varieties. Various comparisons conducted throughout the state show that the hybrids produce an average gain of 14 bushels per acre over the average of high and low yielding open-pollinated varieties. Corn production is increasing in Louisiana as indicated by the fact that approximately 70,000 acres were planted in 1945 with seed of hybrid corn. The increased yield was about one million bushels, which was valued at \$1,300,000.

Thirty-one seed producers, representing various sections of Louisiana, cooperated in producing hybrid seed corn. Most of them were successful and produced good yields of high quality seed. A few fields were abandoned on account of high water and some were almost failures due to excessive moisture. Seed of five leading Louisiana hybrids adapted to the different areas of the state are available for planting in 1946. White hybrids 468, 518 and 3802 are suited to the northern part of the state. White hybrid 518, which has good weevil resistance, also is adapted to central and southeastern Louisiana. Hybrid 1031, with yellow, white-capped kernels, is suited to the entire state on soils of high fertility. Seed of Hybrid 1030 is not available for planting in 1946, but it is expected that seed of this hybrid will be available for distribution in 1947. Hybrid 1030 has excellent weevil resistance and is well suited for mechanical harvesting. Hybrid 2909 is adapted to the lower Red River and lower Mississippi River alluvial soils.

Although good hybrids are now in production, the study and testing of new breeding materials is in progress in order to determine better hybrids than those now available.—*Hugo Stoneberg.*

Cotton Investigations

Cotton Disease Studies

Seed Treatment Improves Stands by Reducing Seedling Disease Damage

These investigations were continued the past year by the Division of Cotton and Other Fiber Crops and Diseases, U. S. Department of Agriculture, in cooperation with the Louisiana Agricultural Experiment Station, and represent part of a regional test being conducted throughout the states of the main cotton belt. The primary objective of the investi-

gations is to obtain information that may be utilized by the grower to insure good stands of cotton, an important requisite in profitable production. Studies are made in field plantings of those chemicals which in preliminary greenhouse tests have shown promise in reducing seedling disease losses. Other aspects of the work are rates of treatment for optimum emergence and comparisons of the effect of treatment of regular ginned (fuzzy) and machine delinted (reginned) seed lots on stand improvement. In 1945 six dust treatments were compared at three treatment levels, using fuzzy and reginned seed stocks grown in North Carolina in 1944. These stocks were heavily infested with the anthracnose fungus, an important seedling disease in the Southeast.

The effect of the various treatments and treatment rates on seedling stand at Baton Rouge, as calculated from the per cent emergence 18 days after planting, are shown in Table 1. In the order named, DuBay 1452F, Dow B, Dow A and Ceresan 5 per cent gave the best stands of seedlings, all of which were highly significant over untreated seed. For the above chemicals 1.5 ounces per bushel appears to be about the optimum rate for cottonseed. In former years the reginned seed treatments have usually given higher emergence values and better seedling survival, but in the 1945 tests, with the exception of the Isothan and one DuBay 1452F and two Dow 9B treatments, the values for the fuzzy seed were higher.



Seed Treatment Test Plots at Baton Rouge, Louisiana.
Row at A and rows at left of A planted with treated seed; row at B and rows at right of B planted with untreated seed. Season, 1945.

TABLE 1. COTTONSEED TREATMENT—TEST C. BATON ROUGE,
LOUISIANA. YEAR—1945

Seedling stand 18 days after planting* following treatment of seed lots
with various chemicals at rates indicated. Seed lots
Coker 100, North Carolina

Treatment		Fuzzy					Reginned					Treat- ment Mean
		Replications				Mean	Replications				Mean	
		1	2	3	4		1	2	3	4		
		%	%	%	%	%	%	%	%	%	%	
Ceresan 5%	—3 oz.†	63.4	68.9	61.5	65.9	64.9	45.1	33.6	52.7	42.3	43.4	
"	1.5 oz.	67.6	62.9	79.4	69.2	69.7	37.1	34.5	58.6	53.2	45.8	
"	3/4 oz.	77.4	61.0	75.5	60.3	68.5	46.1	30.4	58.0	54.7	47.3	
Dow 9 A†	—3 oz.	57.5	56.8	83.1	63.5	65.2	48.5	35.6	65.2	48.7	49.5	
"	1.5 oz.	54.1	57.8	79.3	71.6	65.7	43.0	46.4	66.2	47.7	50.8	
"	3/4 oz.	58.7	53.6	74.9	75.2	65.6	43.2	35.2	74.9	36.2	47.3	
DuBay 1452F	—3 oz.	47.2	71.6	63.4	57.0	59.8	39.1	54.9	47.0	46.5	46.8	
"	1.5 oz.	72.3	61.7	86.3	69.6	72.4	80.0	86.8	70.3	67.5	76.1	
"	3/4 oz.	67.8	53.0	82.2	74.9	69.4	47.8	74.5	63.8	50.0	59.0	
Dow 9 B**	—3 oz.	54.3	48.8	71.9	73.4	62.1	43.3	50.9	59.6	50.7	51.1	
"	1.5 oz.	55.6	86.3	66.2	67.0	68.7	68.4	70.8	60.3	80.2	69.9	
"	3/4 oz.	52.7	67.0	65.8	58.5	61.0	59.5	64.6	55.2	70.7	62.5	
Mersolite	—3 oz.	46.2	48.2	72.3	67.1	58.4	34.3	38.5	61.8	42.9	44.3	
"	1.5 oz.	71.6	44.5	65.6	64.5	61.5	35.7	40.4	60.4	52.6	47.2	
"	3/4 oz.	33.6	50.0	57.2	57.7	49.6	40.6	38.4	54.2	40.7	43.4	
Isothan	—3 oz.	38.8	20.9	65.3	33.0	39.5	28.7	53.6	63.6	39.6	46.3	
"	1.5 oz.	31.5	21.8	65.0	25.3	35.9	38.0	54.0	63.4	31.5	46.7	
"	3/4 oz.	38.9	16.9	69.5	58.4	45.9	34.9	53.0	50.2	54.9	48.2	
Untreated		38.3	42.9	50.2	60.2	47.9	19.3	37.7	43.9	24.2	31.2	
Difference required for significance—5% point.....						19.2	.....	.....	.....	.....	19.2
1% point.....						25.5	.....	.....	.....	.....	25.5

*Planted April 30 and May 1

†Ounces per bushel

‡Per cent toxicant in dust—50

**Per cent toxicant in dust—25

Seed type mean: Diff.

Fuzzy = 59.5

Reginned = 50.4 9.1

L.S.D. = 6.5

Fusarium Wilt

Roguing and Selection for Wilt Resistance

This work was continued along much the same lines as previously reported. The method of obtaining satisfactory resistance has been that of testing roguing and selection over a three-year period. This has been accomplished with a hybrid, Dixie Triumph x Deltapine, and the same procedure is now being used with a semi-resistant line of Stoneville 2B. Infected plants are rogued at 15-day intervals from June to



Wilt-Resistant Variety Study at Baton Rouge, Louisiana.
Test plots of Dr. H. B. Brown, Plant Breeder and Agronomist. Variety at left, resistant; center, highly susceptible; right, highly resistant. Season, 1945.

September on uniformly infested land. Outstanding, healthy plants are tagged and roots also examined at harvest for vascular discoloration. The best disease-free plants, especially those having good staple length, high lint per cent, and other desirable fiber properties, are selected and progenies of these selections studied again in plant-to-row tests for resistance. Some of the progenies of the Dixie Triumph hybrid were tested for yield and resistance the past season and made a satisfactory performance. It would appear that some of these strains are now ready for increase and ultimate release for use in wilt-infested districts.

Inheritance of Wilt Resistance

Work preliminary to these investigations was begun last season. Crosses were made between resistant and susceptible lines, all inbred for several years, and included varieties of long, short, and intermediate staple lengths, respectively. As a result of artificial inoculation of field plots from 1938 to 1942, with the wilt fungus, *Fusarium vasinfectum*, we now have available uniformly infested soil for inheritance studies at this Station. The F_2 and F_3 generations of some of these crosses and parental lines also are being utilized in connection with studies of their reaction to fusarium wilt extracts, a new approach for quickly determining resistance.

Chemical and Microbial Studies of Soil from Wilt-Free and Wilt-Infested Areas of the Same Field

To determine the factors which favor the prevalence of wilt in certain areas of fields and its absence in others, chemical analyses and studies of the microflora of the soil of these areas have been made. Chemical analyses of the soil from a sharply defined healthy area and an adjoining heavily infested area were made at the suggestion of the writer by Dr. W. J. Peavy of the Crops and Soils Department. These analyses reveal striking differences. The soil in the healthy area is high in available phosphorus, potassium and calcium, with reaction near neutral pH 6.9, whereas, in contrast, that in the infested area is extremely low in phosphorus, 50 per cent lower in both potassium and calcium, with reaction acid—pH range 5.2—5.7. Analyses for nitrogen and organic matter also are being made, but as yet are incomplete.

Studies of the microflora of the same soil areas also have been made to determine whether organisms antagonistic to the fusarium wilt fungus might be involved. The dilution plate method was employed, and, for isolation and culture of the various soil organisms, Conn's glycerine asparaginate agar and potato-dextrose agar were employed in Petri plates with soil dilution ranges from 1:10,000 to 1:300,000. Several species of actinomycetes and one bacterial organism have been isolated from the soil of the healthy area which are antagonistic to fusarium wilt when tested on agar plates. While several actinomycete spp. also have been isolated from the soil of the infested area, no clear-cut antibiotic forms have been encountered. The studies suggest that development of agronomic practices favoring microbial antagonisms may offer a practical line of attack against fusarium wilt as well as other soil parasites of cotton.—*D. C. Neal*.

Cotton Varieties

Hopi crosses were tested in 1944 in comparison with some of the better upland strains, and they made a fair showing. However, the size of the boll of these strains proved comparatively small. Further selection has improved this fault and several strains have been selected having much larger bolls. Some of these strains show exceptionally good strength when tested with the Pressley strength testing machine.

The Stonewilt x Hopi progenies were the most promising, but a few of the Deltapine x Hopi strains were retained for further selection because of the better boll size and high lint percentage.

The four best strains of D. & P. L.-Dixie Triumph cross were tested in the new strains test at Baton Rouge and showed up well. Two of these, 55 x 829-47-3-7-9 and 55 x 829-33-2-9-10 will be increased for release to the farmers in 1947. These strains ranked third and sixth in a test of 21 strains.

Selections in Stoneville 5 x Punjab were omitted last season because of labor shortage but stocks were retained and will be planted this year. Punjab was one of the high-yielding strains in the regional exchange study the past season, indicating further selection in this strain.

Other selections will be made in several hybrid strains in the selfed lines.

Some 70 selfed lines of regional interest were grown this year and self-pollinated material was sent to Knoxville for various studies. These lines will be continued with some revision.

Some 30 selfed lines of local interest were planted in the seed deterioration study conducted in cooperation with Mr. Simpson. These lines were self-pollinated and selections were made for planting in this study the coming season.

New lines of more recent origin than the other selfed lines are being maintained for breeding material.

A number of wilt-resistant lines have been planted in wilt-infested soil and selections have been made from only the disease-free plants. These lines will be continued.

A selfed-line exchange study composed of 64 strains collected from various parts of the Cotton Belt was made. Results from this test were sent to Beltsville, Maryland, for further study.

The fifteen leading strains in the Baton Rouge test show that local adaptation plays an important role in yields. Seven of the 15 leading strains here were from Louisiana selfed lines.

Some 60 strains including 30 selfed lines were planted and bolls were tagged at weekly intervals just as they opened. These tagged bolls were picked and marked for dates of tagging after two weeks' exposure to the weather. They were sent, along with the weather records for the period covered, to Mr. Simpson at Knoxville, Tennessee, for seed deterioration studies.

Considerable interest has been revived in the handcraft industries of South Louisiana. Chief among these projects is the weaving of homespun cloth with natural colored cotton. Several samples of brown cotton have been secured and it is planned to try to improve yields and fiber characters of these cottons by selection and crossing with other strains carrying a factor for brown color.—*John R. Cotton.*

Sweet Potato Disease Investigations

Since the inception of the cooperative breeding program between the Division of Fruit and Vegetable Crops and Diseases of the United States Department of Agriculture and many of the horticultural departments of the agricultural experiment stations of the states within the sweet potato belt, a large number of sorts has been tested in the field, greenhouse, and hotbeds to determine their reaction to such diseases as soil rot, stem rot (wilt), and black rot. In addition, observations have been

made in the field on the presence of these diseases as well as others of less importance.

Three new varieties of sweet potato were included in the number that has been tested and they have been released recently for commercial use. They are Pelican Processor, Queen Mary and Ranger. These varieties are particularly interesting because they are the first ones of any commercial importance that have been derived from seed in the United States. The crosses which produced the seeds were made under the direction of Dr. J. C. Miller of the Horticultural Research Department of the Louisiana Experiment Station, where the breeding work is conducted for this cooperative breeding project.

The preceding varieties were tested for resistance to soil rot and stem rot (wilt) in soil that had been infested artificially with the causal organisms of these diseases. Separate fields, that were isolated from commercial plantings of sweet potatoes and did not drain in their vicinity, were used for each disease. The slips and vine-cuttings of the various sorts were inoculated by dipping them in spore suspensions of the causal organisms before they were planted, to prevent them from escaping infection. Similar tests were conducted in the greenhouse and hotbeds. Observations were also made on the prevalence of such diseases as white rust and leaf blight on the foliage of the sorts planted in the soil rot and stem rot fields. Records were made of the damage from scurf when the roots were harvested in the fall.

The results of the different tests and observations are summarized in the table entitled, "Reaction of Three New Varieties of Sweet Potato to Diseases."

An examination of the table on page 139 shows that the variety Pelican Processor is the only one found to be resistant to any of the diseases listed. It was demonstrated to be resistant to stem rot (wilt) in the field, as well as in greenhouse, tests. In fact, no external or internal symptoms of stem rot (wilt) have been observed so far in plants of this variety included in the field tests. Other investigators have also found this variety to be highly resistant in their field and greenhouse tests. Although it is a starch type and is one of the highest yielders of starch found so far, this variety is used as a parent in the breeding work to obtain resistance to stem rot (wilt) in sorts of the table type. This same variety was not found to be as susceptible to white rust as the other two varieties. It was classified as being only slightly susceptible to this disease.

The other two varieties, Queen Mary and Ranger, have a high carotene content and are used accordingly for table purposes. They were found to be very susceptible to such important diseases as stem rot (wilt) and soil rot, but were somewhat resistant to such minor diseases as white rust and leaf blight, being rated as moderately susceptible.

REACTION OF THREE NEW VARIETIES OF SWEET POTATO TO DISEASES

Diseases (Causal Organisms)	Varieties		
	Pelican Processor	Queen Mary	Ranger
Soil Rot (<i>Actinomyces ipomoea</i> Persons and Martin)	Very susceptible	Very susceptible	Very susceptible
Stem Rot (Wilt) (<i>Fusarium batatas</i> Wr. and <i>F. hyperoxysporum</i> Wr.)	Resistant	Very susceptible	Very susceptible
Black Rot (<i>Ceratostomella fimbriata</i> (E. and H.) Ell.)	Very susceptible	Very susceptible	Very susceptible
Scurf (<i>Monilochaetes infuscans</i> Hals.)	.....	.....	Very susceptible
White Rust (<i>Albugo ipomoeae</i> — <i>pandurana</i> (Schw.) SW.)	Slightly susceptible	Moderately susceptible	Moderately susceptible
Leaf Blight (<i>Phyllosticta batatas</i> (Thum) Cke)	.....	Moderately susceptible	Moderately susceptible
End Rot (? <i>Fusarium oxysporum</i> Schlecht)	.....	Very susceptible	.....

From tests conducted in the laboratory and observations made in the field, it was found that the three varieties—Pelican Processor, Queen Mary and Ranger—were very susceptible to black rot. In addition, the Queen Mary variety tended to be very susceptible in storage to end rot, which is probably caused by the fungus *Fusarium oxysporum* Schlecht.

—Theodore T. Ayers.

Financial Statement--- Agricultural Research Funds

July 1, 1944 to July 1, 1945

FEDERAL RESEARCH FUNDS

	<i>Hatch</i>	<i>Adams</i>	<i>Purnell</i>	<i>Bankhead-Jones</i>
Appropriations.....	\$15,000.00	\$15,000.00	\$60,000.00	\$56,502.80

EXPENDITURES—FEDERAL FUNDS

Salaries and wages.....	\$14,009.15	\$13,932.22	\$49,258.28	\$45,073.39
Supplies and expense.....	574.59	442.21	7,139.17	5,555.30
Travel.....	312.02	308.57	2,151.77	2,252.06
Capital Outlay.....	104.24	317.00	1,450.78	3,622.05
TOTAL.....	\$15,000.00	\$15,000.00	\$60,000.00	\$56,502.80

EXPENDITURES—STATE FUNDS

	<i>Bankhead-Jones Offset</i>	<i>State Non-offset</i>	<i>Other* State Funds</i>	<i>Research Fellowships</i>
Salaries.....	\$40,072.53	\$48,085.51	\$60,878.62	\$13,281.38
Wages.....	13,915.72	6,127.62	47,438.10	5,760.04
Supplies and Expense.....	11,931.00	8,730.27	46,867.44	3,513.80
Travel.....	2,607.43	2,300.29	7,869.18	3,207.38
Capital Outlay.....	1,745.40	3,051.35	20,088.69	3,050.95
TOTAL.....	\$70,272.08	\$68,295.04	\$183,142.03	\$28,813.55

*Includes appropriations for sub-stations and special Legislative appropriations.

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K. L. Cockerham, M.S., Entomologist
Oliver T. Deen, B.S., Entomologist
Irwin L. Saveson, B.S., Drainage Engineer

^a Part-time teaching

^b On military leave

^c Transferred

^d On leave of absence

^e Appointed after July 1, 1944

^f Resigned

^g On military leave, reported killed December 15, 1944

^h On military leave, reported killed February 19, 1945

ⁱ Deceased

Det. Duc

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